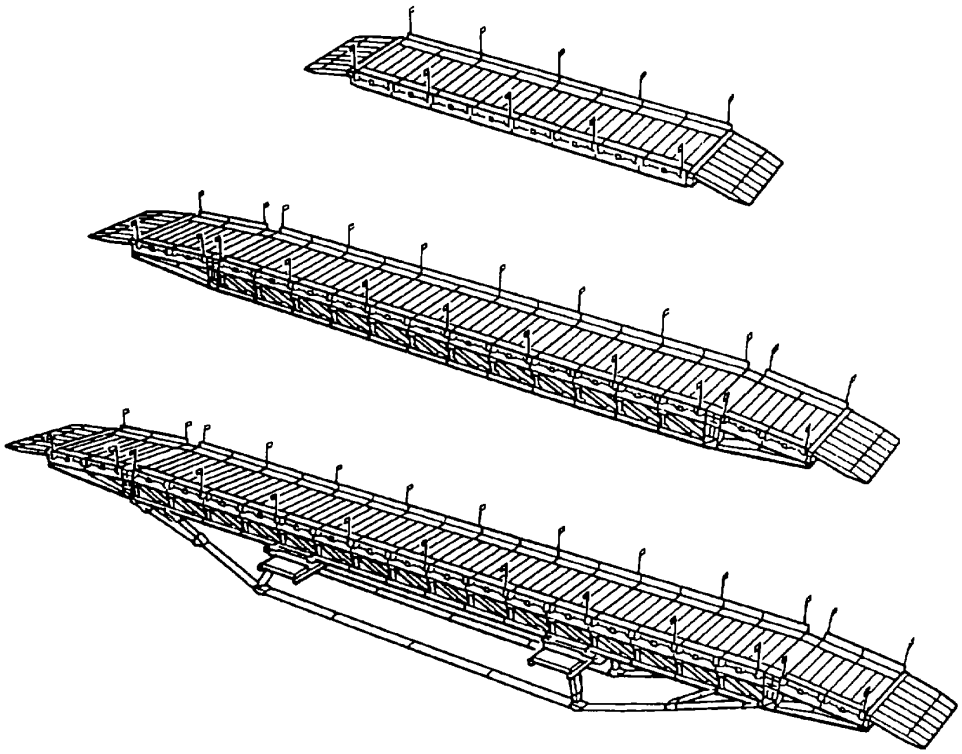
UNIT AND DIRECT SUPPORT MAINTENANCE MANUAL



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MEDIUM GIRDER BRIDGE

INCLUDING

BRIDGE SET	**NSN 5420-00-172-3520**
BRIDGE ERECTION SET	**NSN 5420-00-172-3519**
LINK REINFORCEMENT SET	**NSN 5420-01-139-1503**

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26 AUGUST 1992

WARNING

If bituminous black material is oozing from a component, with the exception of seal plates, this indicates a serious crack. Component must be removed to Depot Maintenance.

The shaded areas on the component illustrations indicate safety critical areas where repairs are not permitted.

Cleaning solvent is toxic and flammable. Use only in well ventilated area and avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use In excessive amounts and avoid skin contact.

When using compressed air, wear safety goggles or glasses and ensure that air blast is not directed towards another person.

Wear protective eye goggles when chipping or grinding. Failure to do so can result in eye injuries and loss of sight.

Refer to FM 21-11 for artificial respiration practices.

Pretreatment primer contains an acid component. Eye protection must be worn when mixing and applying primer.

Jointing and sealing compounds are toxic and flammable. Use only in a well ventilated area and avoid prolonged breathing of fumes. Keep away from flames. Do not use in excessive amounts. Avoid skin and eye contact and ingestion.

Death or serious injury will occur if PMCS is not carried out at the intervals stated in Table 2-2 by a person familiar with the use and application of the MGB components.

Components suspended in boiling water can cause severe burns. Always wear protective gloves.

Serious injury to personnel or damage to components may occur if frame is not safely supported when lifted to ease repair.

DANGER
RADIATION RISK

The Post Tensioning Assemblies Sliding Block Marker Light or Betalights (page 2-95) contain tritium (H-3) gas. These lights are potentially hazardous when broken indoors. See qualified medical personnel, your servicing Radiation Protection Officer, and/or the Safety Director if you are exposed indoors to, or cut by, broken betalights. Disposal of these betalights must be in accordance with AR 385-11.

Change No. 3

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UNIT AND DIRECT SUPPORT MAINTENANCE MANUAL

MEDIUM GIRDER BRIDGE (MGB) INCLUDING

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BRIDGE ERECTION SET	NSN 5420-00-172-3519
LINK REINFORCEMENT	NSN 5420-01-139-1503

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MEDIUM GIRDER BRIDGE (MGB)
INCLUDING

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BRIDGE ERECTION SET	**NSN 5420-00-172-3519**
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HEADQUARTERS U.S. MARINE CORPS
WASHINGTON, D.C., 30 July 1993

Unit and Direct Support Maintenance Manual
MEDIUM GIRDER BRIDGE
INCLUDING

BRIDGE SET	NSN 5420-00-172-3520
BRIDGE ERECTION SET	NSN 5420-00-172-3519
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NO. 5-5420-212-23

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UNIT AND DIRECT SUPPORT MAINTENANCE MANUAL

MEDIUM GIRDER BRIDGE (MGB)
INCLUDING
BRIDGE SET NSN 5420-00-172-3520
BRIDGE ERECTION SET NSN 5420-00-172-3519
LINK REINFORCEMENT SET NSN 5420-01-139-1503

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CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION

1-1 SCOPE

This is a maintenance manual for the use of the Unit and Direct Support Maintenance functions. The manual covers the bridge set, bridge erection set and link reinforcement set components, as allocated by the Maintenance Allocation Chart in Appendix B of this manual. Further maintenance instructions for MGB can be found in TM 5-5420-212-10-1, Operator's Manual, and DMWR 5-5420-212, Depot Maintenance Work Requirement.

1-2 MAINTENANCE FORMS, RECORDS AND REPORTS

a. ARMY. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, The Army Maintenance Management System.

b. MARINE CORPS. Maintenance forms and procedures will be those prescribed by TM 4700-15/1.

1-3 DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Refer to TM 750-244-3.

1-4 CALIBRATION

Calibration is not required on any equipment at these levels of maintenance.

1-5 PREPARATION FOR STORAGE OR SHIPMENT

Packaging and administrative storage is covered in Chapter 2, section VII of this manual.

1-6 OFFICIAL NOMENCLATURE, NAMES AND DESIGNATIONS

COMMON NAME	OFFICIAL NOMENCLATURE
Adjustable Support	Roller Beam Support, Adjustable, Bridge
Anchor Assembly (AA)	Anchor Piece Assembly
Anchorage Pin Assembly	Anchorage Pin Assembly, Mk 2
Anti-Flutter Tackle (AF)	Anti-Flutter Cable Assembly
Bankseat Beam (BSB)	Beam, Bankseat, Bridge
Baseplate (Single Story)	Baseplate, Roller Beam Support
Baseplate (Double Story)	Baseplate, Building Frame, Bridge
Bottom Panel (BP)	Panel, Bottom, Bridge
Bracing Pin	Pin, Bracing

COMMON NAME	OFFICIAL NOMENCLATURE
Bridge Marker Guide	Marker, Bridge, Guide Assembly
Building Pedestal (BP)	Pedestal, Building, Bridge
Capsill	Capsill, Bridging
Capsill Pin	Pin, Capsill
Carrying Bar	Carrying Bar, Bridge Parts
Carrying Handle	Carrying Handle
Curb	Curb, Bridge
Davit Post Assembly	Davit Post Assembly
Deck	Deck Unit, Bridging
End Taper Panel (ETP)	Panel, End Taper, Bridge
Equipment Bag	Bag, Equipment
Equipment Basket	Basket, Bridging, Equipment
Extractor Cable	Extractor, Cable Assembly
Fixed Support	Roller Beam, Support, Fixed, Bridge
Footwalk	Footwalk, Bridge
Footwalk Bearer	Bearer, Footwalk
Footwalk Post	Post, Footwalk, Bridge
Frame Cross Girder	Cross Girder, Building Frame, Bridge
Guard Rope	Rope, Guard
Hammer (Nylon Faced)	Hammer, Hand
Headless Panel Pin	Pin, Panel, Headless
Hydraulic Jack 15T	Jack, Hydraulic, Hand,15 Ton
Hydraulic Jack 20T	Jack, Hydraulic, Hand, 20 Tonne
Jack Post	Post, Jacking, Bridge
Jack Seat	Jack Seating, Building Frame, Bridge
Jack Support	Support, Jack, Bridge
Jacking Bracket	Bracket Assembly, Jacking

COMMON NAME	OFFICIAL NOMENCLATURE
Junction Panel (JP)	Panel, Junction
Landing Roller (LR)	Roller, Landing, Bridge
Landing Roller Pedestal Mk 1 (LRP)	Pedestal, Landing Roller, Adjustable, Bridge Mk 1
Landing Roller Pedestal Mk 2 (LRP)	Pedestal, Landing Roller, Adjustable Bridge Mk2
Launching Nose Cross Girder (LNCG)	Cross Girder, Launching Nose, Bridge, Mk 3
Launching Nose Cross Girder Post	Post, Launching Nose, Cross Girder (Special)
Launching Nose Heavy (LNH)	Launching Nose Unit, Heavy, Bridge
Launching Nose Link (LNL)	Link, Launching, Two Tier
Launching Nose Pin	Pin, Launching Nose
Launching Nose Roller (LNR)	Roller, Launching Nose, Bridge, Mk 2
Lifting Sling	Sling, Multiple Leg
Light Launching Nose Front (LLNF)	Launching Nose Unit, Light, Bridge, Front
Light Launching Nose Rear (LLNR)	Launching Nose Unit, Light, Bridge, Rear
Light Tackle (LT)	Tackle, Light
Long Ramp	Ramp Unit, Special
Long Reinforcing Link	Link, Reinforcing, Long
Longitudinal Girder	Longitudinal Girder, Building Frame, Bridge
Packing Timber	Packing, Timber
Pallet	Pallet Assembly
Pallet Adapter	Adapter Assembly, Pallet To Trailer
Panel Erection Aid	Panel Erection Aid, Bridge
Panel Pin	Pin, Panel
Post Tensioning Assembly (PT)	Post Tensioning Assembly, (Short Post)
Puller	Puller, Ratchet Lever, Cable Type
Push Bar Adapter	Adapter Assembly, Push Bar
Push Bar Cross Girder (PBCG)	Cross Girder, Push Bar, Bridge
Push Bar Long (PB)	Push Bar, Long, Launching, Bridge

COMMON NAME	OFFICIAL NOMFNCLATURE
Push Bar Short (PB)	Push Bar, Short, Launching, Bridge
Ratchet Wrench 3/4 inch	Wrench, Ratchet, Reversible 3/4 inch
Retainer Clip	Clip, Panel Pin
Rocking Roller	Roller Assembly, Rocking, Bridge
Roller Beam (RB)	Roller Beam, Bridge
Rubber Buffer	Pallet, Rear Buffer Assembly
Short Ramp	Ramp Unit, Bridge
Short Reinforcing Link	Link, Reinforcing, Short
Strap, 5,000 lb	Strap 5,000 lb
Strap, 10,000 lb	Strap Webbing 10,000 lb
Sway Brace	Brace, Sway
Tie-Down Lug	Lug, Tie-Down
Top Panel (TP)	Panel, Top, Bridge
Trailer Mounting Equipment	Trailer Mounting Equipment
Truck Mounting Equipment	Truck Mounting Equipment

1-7 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS

If your MGB equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design.

a. ARMY. EIR will be prepared using SF 368, Product Deficiency Report. Instructions for preparing EIR's are provided in DA Pam 738-750, The Army Maintenance Management System (TAMMS). EIR's should be mailed direct to: Commander, U.S. Army Aviation and Troop Command, ATTN: AMSAT-I-MDO, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. A reply will be furnished directly to you.

b. MARINE CORPS. EIR's should be submitted in accordance with MCO 1650.17 directly to: Commanding General, Marine Corps Logistics Base, ATTN: Code 850, Albany, GA 31704-5000.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-8 EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES

a. The Medium Girder Bridge (MGB) is a two girder deck bridge. The wide upper surfaces of the girders, and the deck units laid between them form a roadway 13 ft 2 in (4.0 m) wide. The girders can be constructed in two forms: a shallow single story construction as shown in Figure 1-1, or a deeper double story construction as shown in Figure 1-2. The double story can be reinforced by adding components of the Link Reinforcement Set (LRS) as shown in Figure 1-3; this permits longer Military Load Class (MLC) 70 bridges to be constructed.

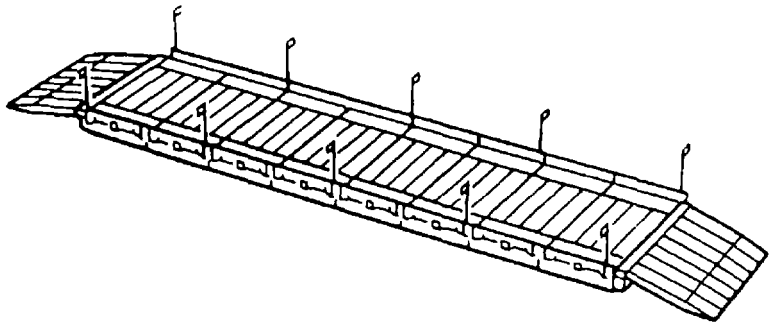


FIGURE 1-1 Single story MGB.

b. The two girders are constructed from a number of panels pinned together, and are separated by two bankseat beams, one pinned to each end of the girders. The roadway is formed by hanging deck units between the girders and connecting ramps to each end. Curbs and guide markers are placed at the outside edges of the girders to mark the edge of the bridge. The single story bridge is used for light loads, for example it will carry MLC 70 Tracked (T) up to 32 ft (9.8 m) decreasing to MLC16 at 74 ft (22.6 m).

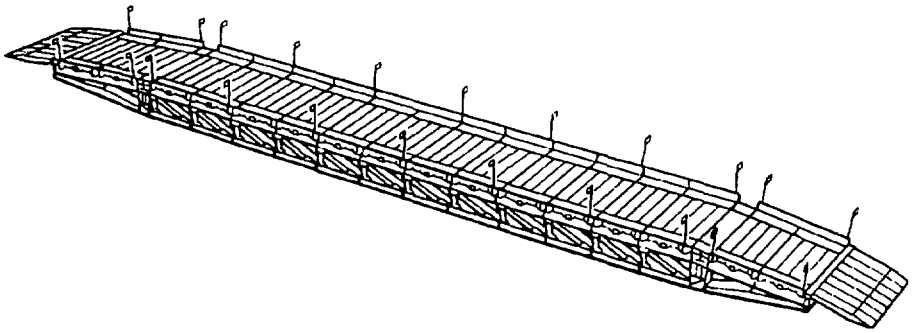


FIGURE 1-2 Double story MGB

NOTE

The US junction panel is slightly larger than standard, therefore the bridge lengths quoted below for double story and link reinforced bridges are "nominal lengths."

c. A double story bridge (DSB) uses all of the parts of a single story bridge (SSB) which are pinned on top of triangular bottom panels, with junction panels and end taper panels at each end. For example these parts make the bridge strong enough to carry MLC 70 (T) over a length of 102 ft (31.1 m) decreasing to MLC 16 at 162 ft (49.4 m).

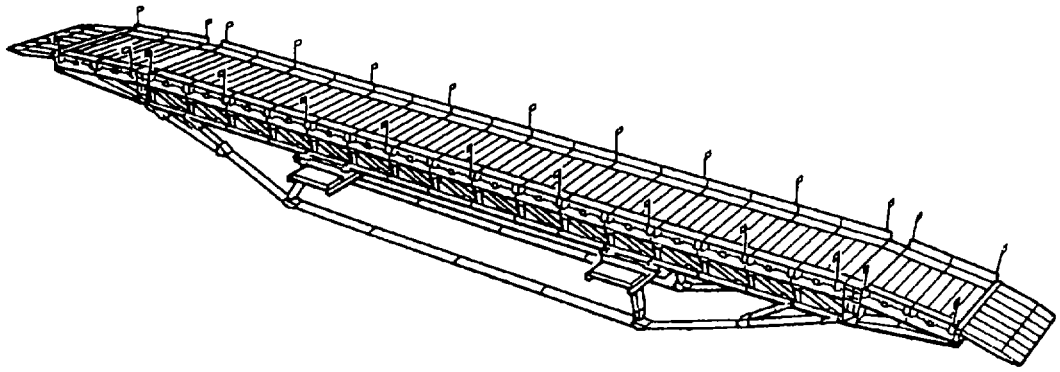


FIGURE 1-3 Link reinforced MGB.

d. The Link Reinforcement Set (LRS) extends the single span capability of the MLC 70 MGB. The set contains all the components needed for use with two bridge sets to construct any length of reinforced MLC 70 (T) MGB up to 150ft (45.7m) and MLC 60 up to 162ft (49.4 m). The LRS consists of reinforcing links 12ft (3.66 m) and 6ft (1.83 m) long which are connected to form a pair of link chains, one beneath each bridge girder. The 6 ft (1.83 m) links are provided for use in bridges that have an odd number of bays.

e. Link reinforcement is added to the bridge during normal bridge construction. The size of the work party is increased from 24 to 32 personnel and this permits addition of the LRS to the bridge without a considerable increase in construction time. A capsill roller beam (CRB) is used when constructing 2E + 13 through 22 bay bridges with link reinforcement. The end anchor and links are added to the bridge as the bottom panels pass the CRB. Additional reinforcement is added as the bridge is boomed forward. When all reinforcement is in place, the bridge can be jacked down. Before decking and ramping, the reinforcement is tensioned using the cable pullers.

f. The link chains are connected to the bottom panels at the ends of the bridge by an anchor assembly, positioned below the bridge girders by reinforcing posts which allow the system to be tensioned. The posts are pulled towards a vertical position by cable pullers. The pullers are fitted to frames in which the top of the posts can slide, then the posts are pinned at fixed points providing the correct tension. The amount of tension is the minimum needed to remove slack from the bridge and reinforcement set.

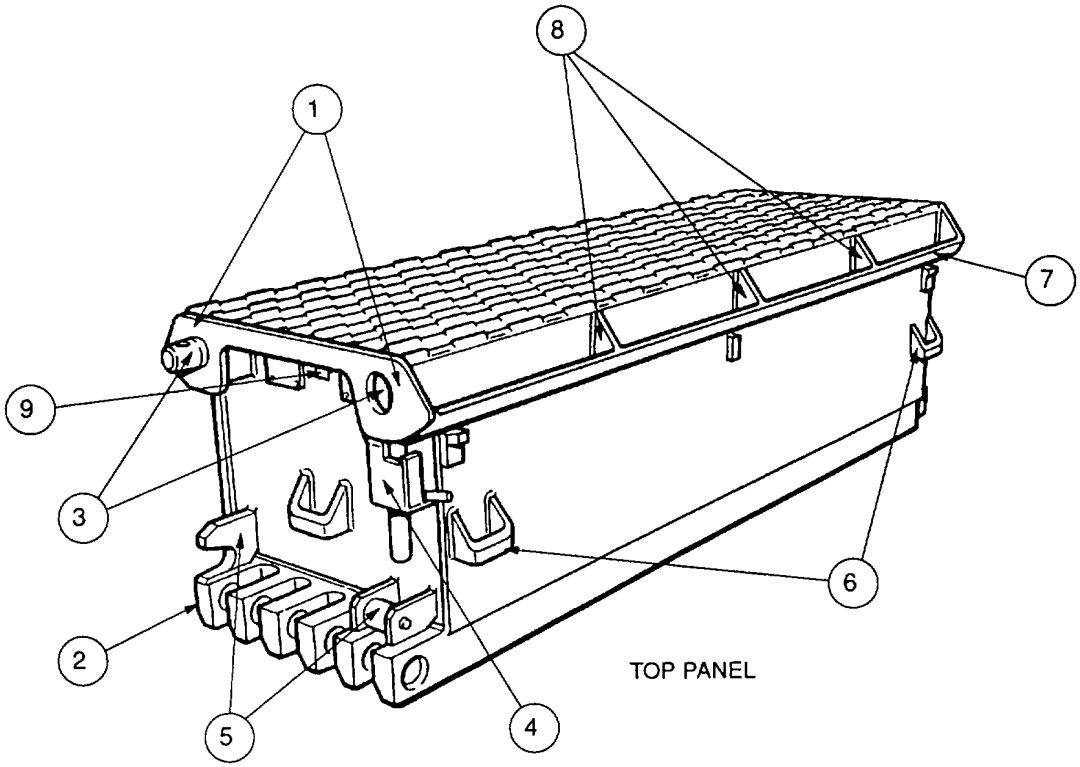
1-9 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

a. **Bridge Components**. Each bridge component is illustrated and its function explained.

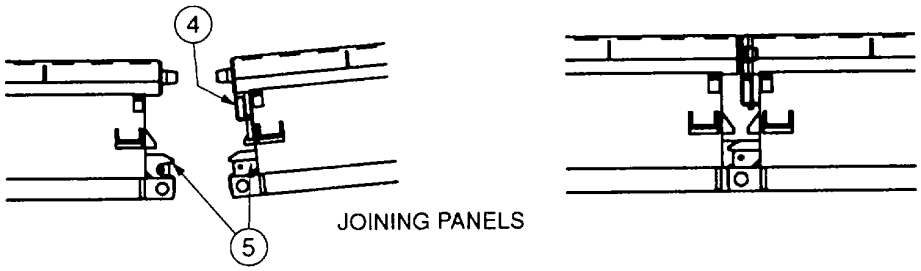
(1) Top Panel (TP)

Top panel form the main girders of the bridge. Top panels, bankseat beams and junction panels have similar dowels, sockets, shoot bolts, compression faces, guide slots, resilient mounts, and pin jaws.

To connect one top panel to another top panel, bankseat beam or junction panel, the dowel and socket is lined up until the compression faces butt together, then the shoot bolt handle is lifted and turned to lock the shoot bolt. The rear of the panel is then lowered to allow the resilient mounts to mate in the guide slot and line up the pin jaws. A panel pin is pushed through the pin jaws by hand, and a retainer clip is inserted through the end of the panel pin. The top panel is a non-directional panel and is carried by four personnel.



TOP PANEL



JOINING PANELS

(1) COMPRESSION FACE. Takes compression load when bridge is completed. Used to line up panels, to close shoot bolts.

(2) PIN JAWS. Takes tension load when connected by panel pin to another panel or beam in bridge.

(3) DOWEL AND SOCKET. Used to line up panels for connection to each other.

(4) SHOOT BOLT. Holds and locks top of panel to another panel or beam during construction.

(5) RESILIENT MOUNT AND GUIDE SLOT. Used to line up pin jaws so panel pins can be put in by hand.

(6) CARRYING BAR BRACKETS. For connection of carrying bars used to carry panel. One bracket at each end, and two on each side. End brackets used to load/unload panel from pallet, and to lift rear of panel to connect to another panel or beam in bridge. Brackets on side are used to carry panel.

(7) DECK RAIL. Used for placement of deck units and curbs.

(8) DECK SPACER. Separates deck units. Prevents deck units from sliding along bridge.

(9) IDENTIFICATION PLATE. The component serial number is marked on this plate.

CAUTION

DO NOT hammer on shoot bolts or panel pins being inserted into panels. Damage to components may result.

(2) Bankseat Beam (BSB)

The bankseat beam is used to provide and maintain spacing between bridge girders and can support the MGB's maximum load when bearing anywhere along its length. The BSB connects to top panels or end taper panels and is carried by six personnel.

The parts of the BSB listed below are similar to those of the top panel and perform the same functions.

Compression Face
Shoot Bolt
Resilient Mount and Guide Slot
Pin Jaws
Dowel and Socket
Carrying Bar Bracket

The parts which are special to the bankseat beam, together with their functions, are described below.

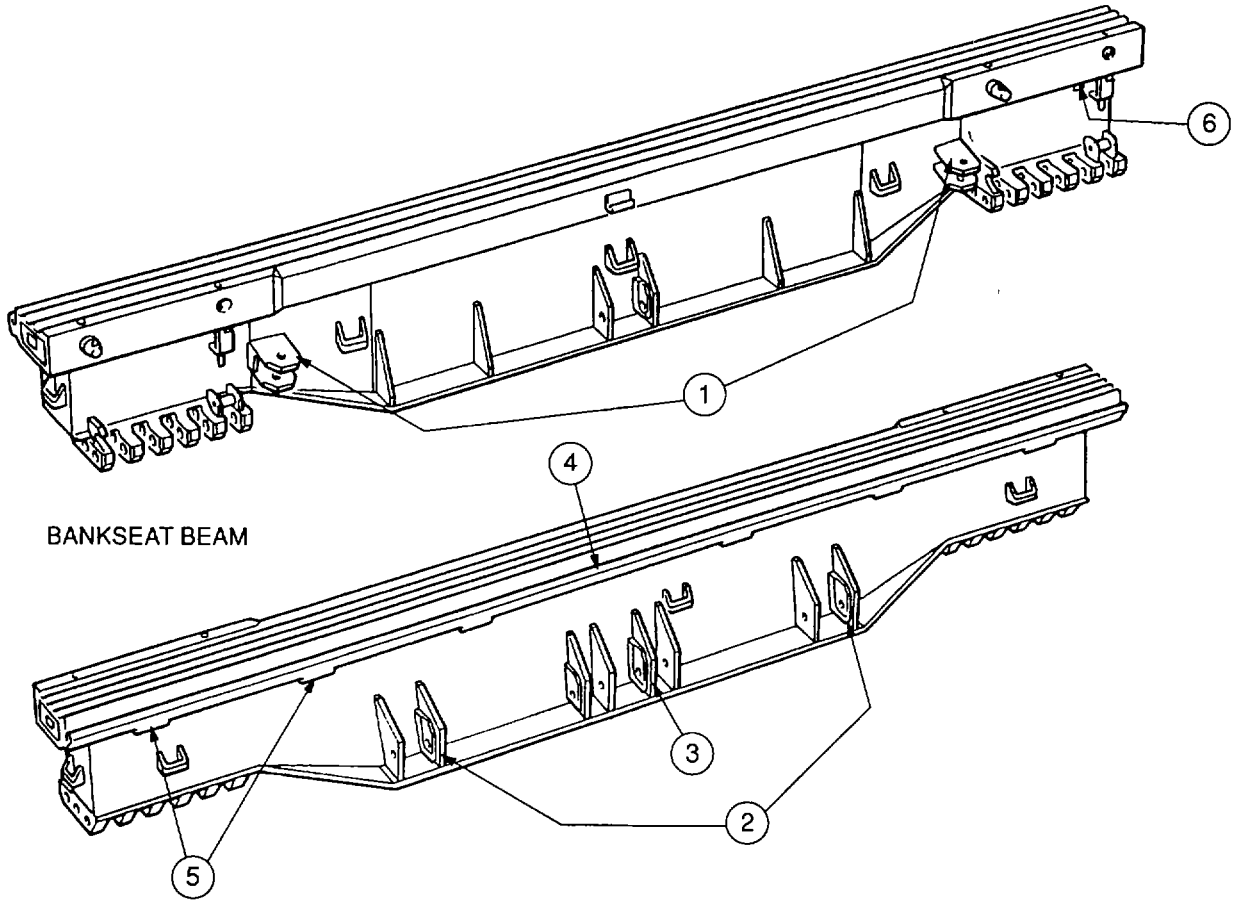
(1) SWAY BRACE BRACKETS. For connection of one end of sway brace to bankseat beam. Only one sway brace is connected to bankseat beam.

(2) JACK POST BRACKETS. For connection of jack posts used to raise or lower bridge. Two brackets on outside of beam are used for connection of jack posts and for connection of the jacking bracket links when using davit posts.

WARNING

DO NOT USE bracket on Inside of beam. Use of inside bracket can result in injury to personnel or damage to bridge.

(3) CENTER BRACKET. For connection of rear end of light launching nose, launching nose roller, and push bar. Components are connected to this bracket with a launching nose pin.



(4) RAMP SHELF. For connection of ramp units to bankseat beam, for connection of jacking bracket links when using davit posts and for connection of launching nose roller.

(5) ANTI-LIFT LUGS. Prevents ramps from lifting off bankseat beam.

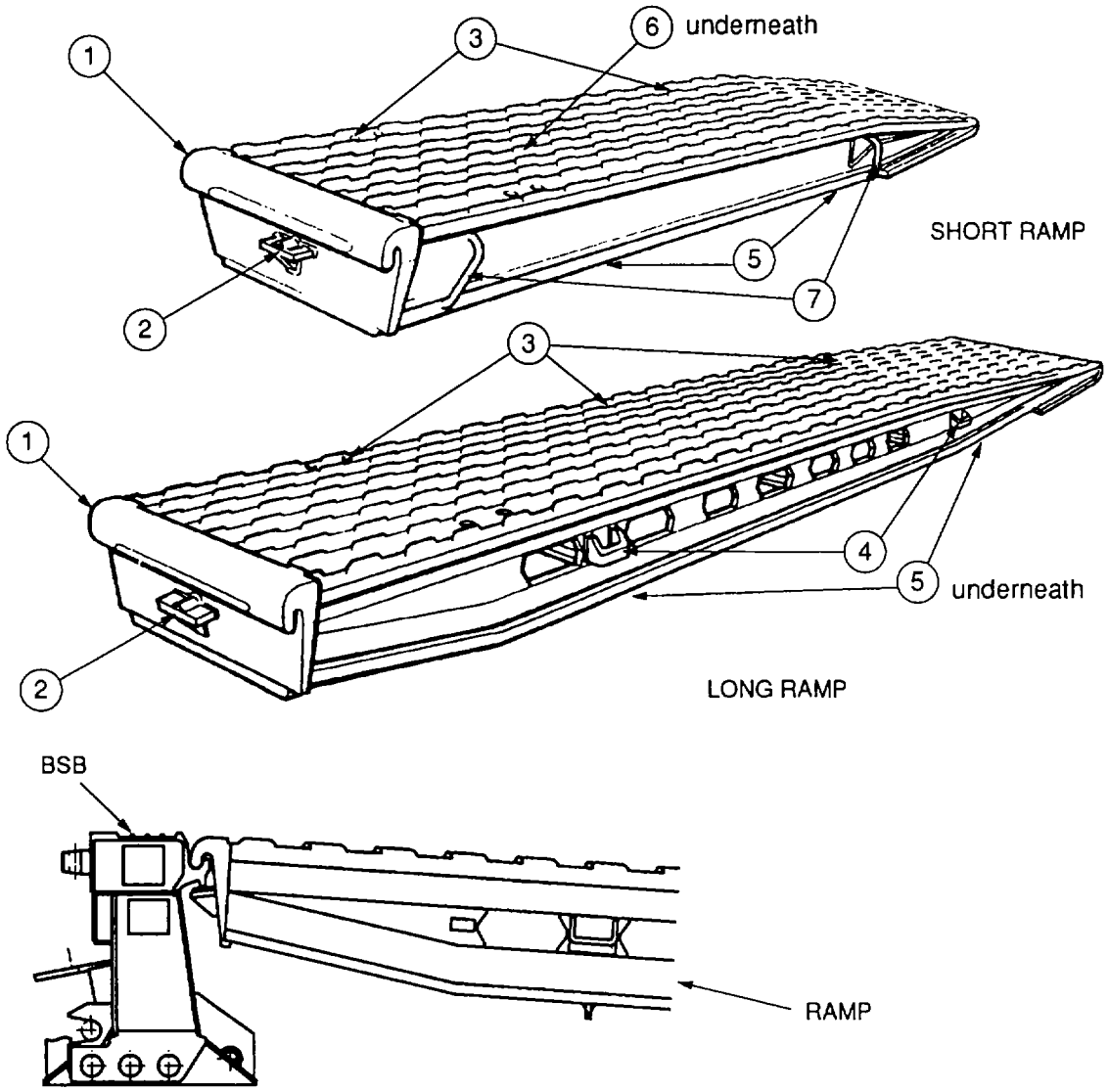
(6) IDENTIFICATION PLATE. The component serial number is marked on this plate.

CAUTION

DO NOT hammer on shoot bolts, panel or nose pins being inserted in bankseat beam. Damage to components may result.

(3) Ramp Unit Short and Long

The ramp unit is used at each end of the bridge and allows vehicles easy access and exit. Seven units are connected to each end. Short ramps are used on single story bridges only. Long ramps can be used on single story bridges, but must always be used on double story bridges. Short ramps are carried by four personnel. Long ramps are carried by four or six personnel.



(1) RAMP HOOK. Fits on ramp shelf of bankseat beam.

(2) ANTI-LIFT LUG. Prevents ramp from lifting off bankseat beam during crossing of traffic.

(3) CARRYING HANDLE HOLES. Pairs of holes on top and to each side of the ramp unit which allow the ramp to be carried using carrying handles. There are four pairs of holes in the short ramp, six pairs in the long ramp.

(4) CARRYING BAR BRACKETS. Long ramps have two carrying bar brackets on each side.

WARNING

DO NOT USE carrying bar brackets as crane lifting points. Serious injury to personnel or damage to bridge may result.

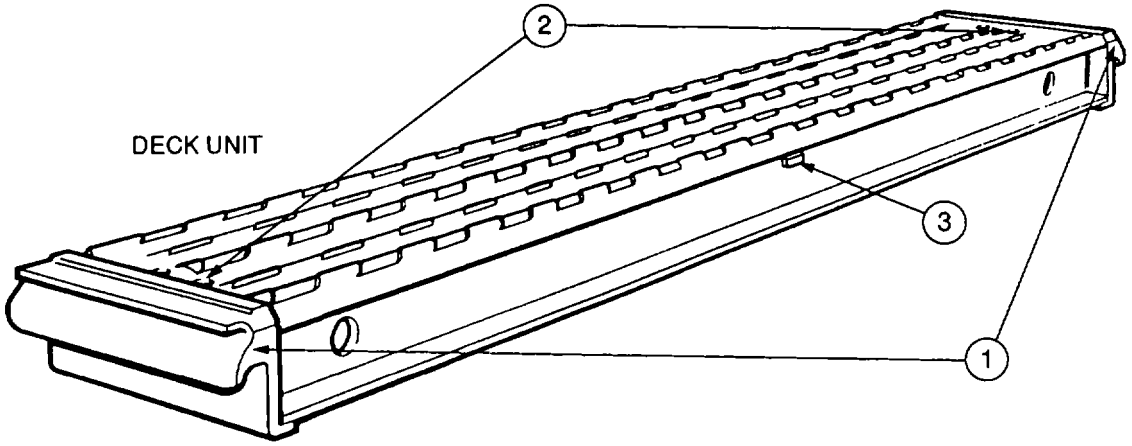
(5) STACKING LUGS. Ramps have lugs underneath that are used for stacking.

(6) IDENTIFICATION PLATE. The component serial number is marked on this plate.

(7) CRANE LIFTING BRACKETS. Short ramps have two brackets on each side for lifting of ramps by crane.

(4) Deck Unit

Deck units are placed between the main girders to complete the bridge roadway. Deck units can also be used as a lever to ease pinning or unpinning of the bankseat beam.



(1) RAIL HOOKS. Rail hooks on either end of the deck unit fasten over the top panel deck rail, securing the deck unit in place.

(2) CARRYING HANDLE HOLES. Two pairs of holes located at each end of the deck allow the deck unit to be carried using carrying handles.

(3) IDENTIFICATION PLATE. The component serial number is marked on this plate.

(5) Curb

The curb is used to warn drivers of their nearness to the edge of bridge. One curb is fitted on each top panel and is carried by one person.

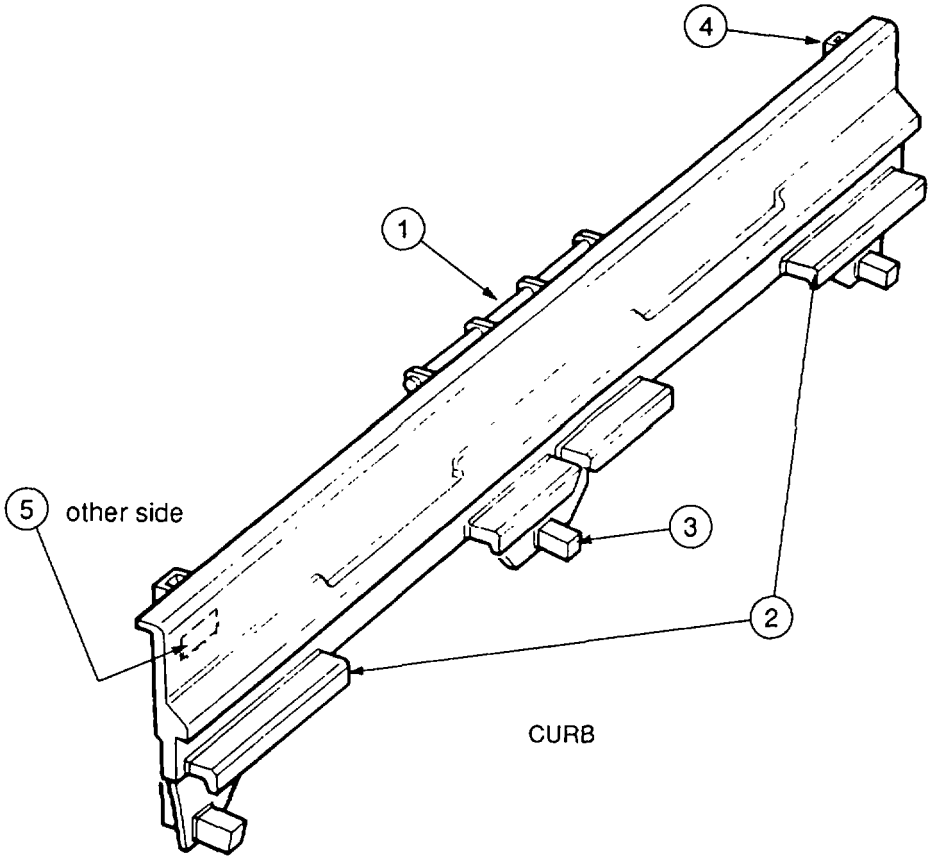
(1) FIXED CARRYING HANDLE. On rear side of curb.

(2) RAIL HOOK. Connects curb to deck rail on top panel.

(3) SUPPORT BLOCKS. Keep curbs in upright position on top panel.

(4) RIDGE MARKER GUIDE HOLES. Holds marker guide.

(5) IDENTIFICATION PLATE. The component serial number is marked on this plate.



(6) Bridge Marker Guide

The marker is placed in the hole at the end of a curb, with the panel positioned to the outside of the curb. Markers are placed according to the number of bays (odd or even) in a bridge (as shown below).

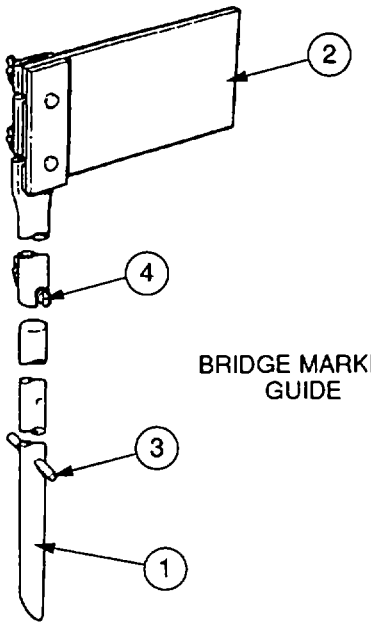
(1) POST. Two tubes which telescope to raise or lower marker.

(2) FLAG ASSEMBLY. Reflective white plastic panel attached to top of post.

(3) SUPPORT PINS. Two pins near bottom of post which help to keep post in position.

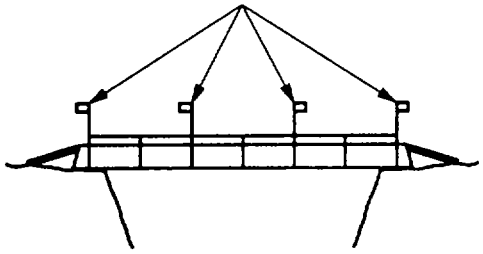
(4) BOLT AND WING NUT. Used to secure post in fully extended position.

NOTE
Remove panels from post before storing markers in baskets.



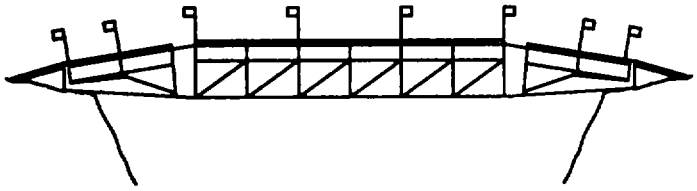
BRIDGE MARKER GUIDE

GUIDE MARKERS

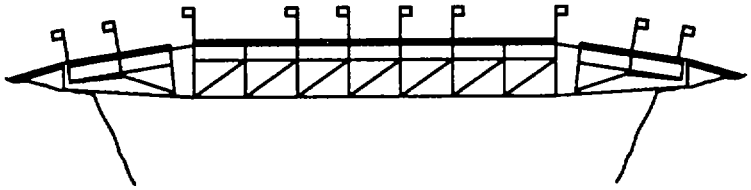


SINGLE STORY – EVEN No. OF BAYS.

SINGLE STORY – ODD No. OF BAYS.



DOUBLE STORY – EVEN No. OF BAYS.



DOUBLE STORY – ODD No. OF BAYS.

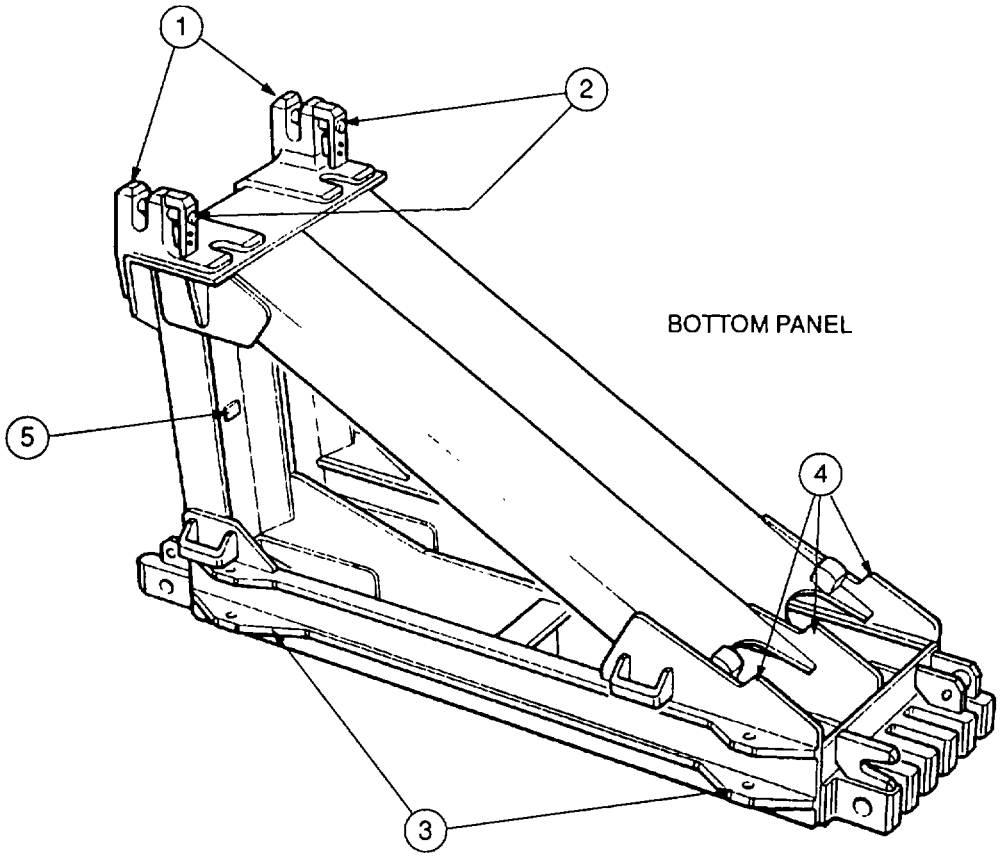
(7) Bottom Panel (BP)

The bottom panel forms a second, deeper girder that is used in double story MGB. The bottom panel's lower pin jaws connect to other bottom panels and junction panels. The upper pin jaws connect to top panels and junction panels. The bottom panel is a directional panel, and the large end always faces the far bank during construction; the panel is carried by four personnel.

The parts of the bottom panel listed below are similar to those of the top panel and perform the same functions.

Carrying Bar Bracket
Resilient Mount and Guide Slot
Pin Jaws

The parts special to the bottom panel, together with their functions, are described below.



(1) TOP JAWS. The top jaws are cradled under the panel pin that fits through the top panel pin jaws.

(2) SHOOT BOLT. The shoot bolt locks the bottom panel to the top panel by closing over the panel pin. The shoot bolt is engaged and released by hand.

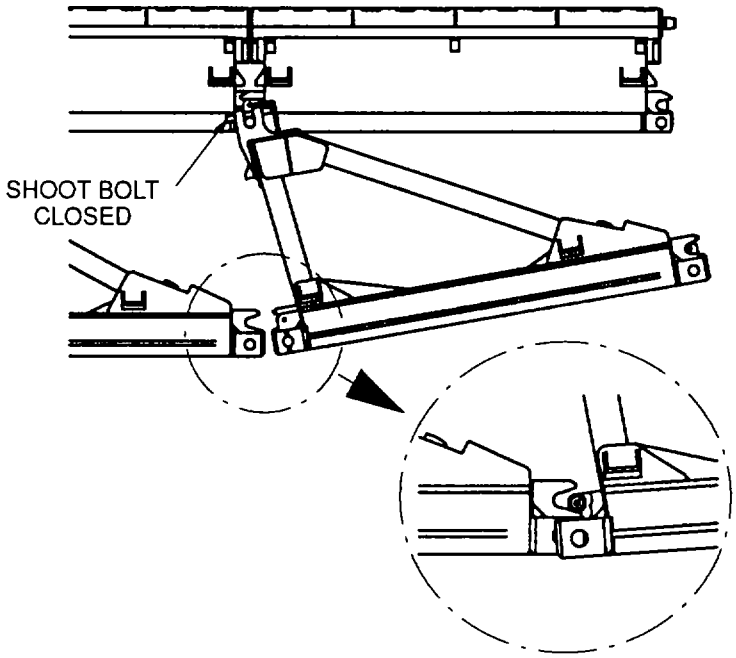
CAUTION
DO NOT hammer on shoot bolt. Damage to component may result.

(3) SWAY BRACE BRACKETS. For connection of sway braces used in double story bridges. There are two brackets on each side.

(4) STACKING PADS. Permits secure and proper stacking of panels for transportation.

(5) IDENTIFICATION PLATES. The component serial number is marked on this plate.

CONNECTING BOTTOM PANELS



(8) Junction Panel (JP)

The junction panel is used in the double story bridge to connect the sloping end of the bridge to the level roadway of the bridge and is carried by four personnel. Curbs are not used on the junction panel.

The parts of the junction panel listed below are similar to those of the top panel and perform the same functions.

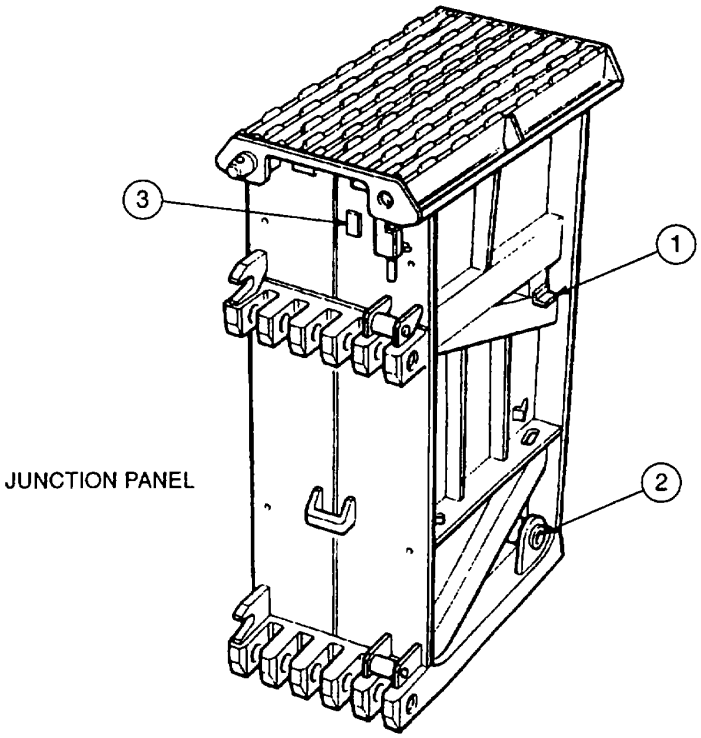
Compression Face
Pin Jaws
Dowel and Socket
Shoot Bolt
Resilient Mount and Guide Slot
Carrying Bar Bracket
Deck Rail
Deck Spacer

The parts special to the junction panel, together with their functions, are described below.

(1) LNCG POST LUG. Used to position launching nose cross girder post.

(2) LNCG POST PIN HOLE. For placement of headless pin to connect launching nose cross girder post.

(3) IDENTIFICATION PLATE. The component serial number is marked on this plate.



NOTE
A headless pin is always used In the post pin hole.

(9) End Taper Panel (ETP)

The end taper panel is a support brace between the junction panel and the bankseat beam. It provides most of the bearing surface needed for support of the bridge.

No more than 7 1/2 ft (2.3 m) of the end taper panel can rest on the ground and provide bearing for the bridge. If this limit is exceeded there will be damage to the bridge. The end taper panel is carried by six personnel.

The parts of the end taper panel listed below are similar to those of the top panel and perform the same functions.

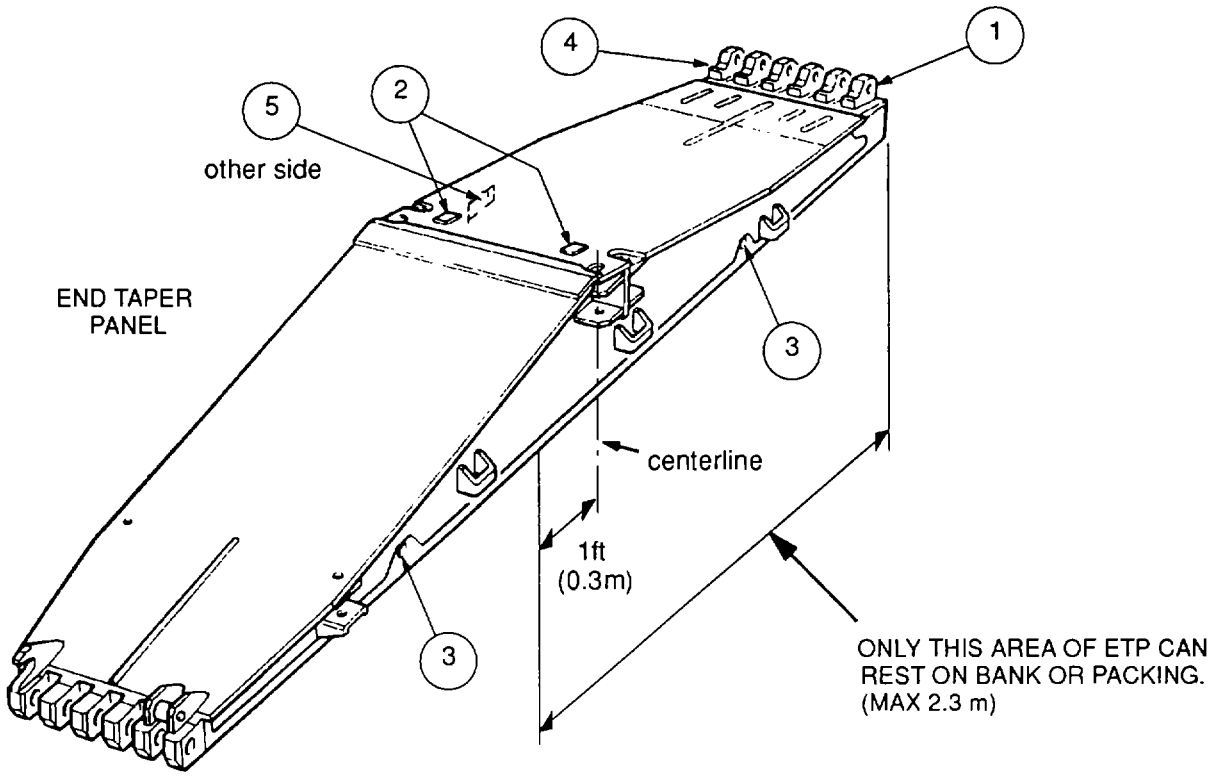
Pin Jaws (Gap End)
Resilient Mount and Guide Slot
Carrying Bar Brackets
Sway Brace Brackets

The parts special to the end taper panel, together with their functions, are described below.

(1) PIN JAWS (Bank End). Connects to pin jaws of bankseat beam. Provides pin seating for guide pin in bankseat beam.

(2) PIN STOPS. Used to position panel pin under top panel before junction panel is put on.

(3) ANCHORAGE PIN HOLES. Used for placement of anchorage pin, and for panel pin used for attaching footwalk bearer.



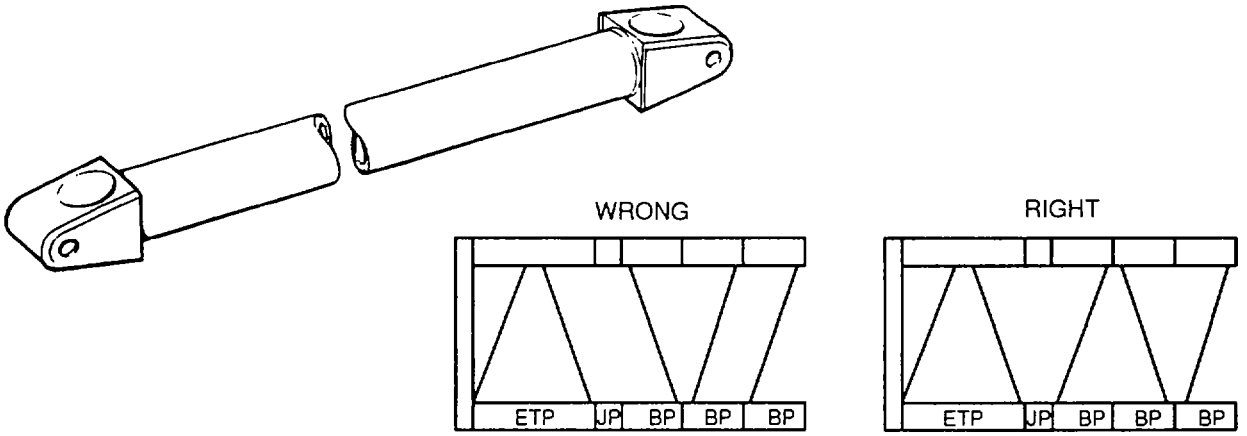
(4) GUIDE PIN SEATING. Used with a panel pin to aid the assembly of end taper panel to the bankseat beam.

(5) IDENTIFICATION PLATE. The component serial number is marked on this plate.

(10) Sway Brace

The sway brace is used as a cross member between the bottom panels in girders of double story bridges. It is pinned to sway brace brackets with bracing pins and retainer clips.

CAUTION
DO NOT USE sway braces as levers. Damage to brace may result.



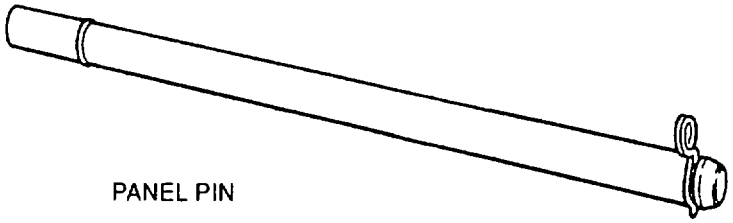
(11) Panel Pin

Panel pins are used to connect top panels, bottom panels, junction panels, end taper panels, bankseat beams, and for securing the launching nose through the launching nose roller and anchorage tube. The panel pin has a shoulder at one end and is slotted at the other end. There are holes in the slot for the retainer clip.

All pins are fitted into the bridge by hand from the outside of the girder. When pin jaws, resilient mounts and guide slots are properly mated, the pin can be inserted easily by hand. Retainer clips are put through the hole at the end of the pin for safety. It is not necessary to put a retainer clip through the pin connecting the bankseat beam to the end taper panel, and the pin connecting bottom panel to top panel, but it is good practice to clip all pins to prevent confusion.

When constructing a long DSB (13 thru 22 bay), it is necessary to ensure that retainer clips are placed horizontally through panel pins in the bottom chord of bottom panels.

CAUTION
DO NOT hammer on panel pins. Damage to pin or bridge component may result.



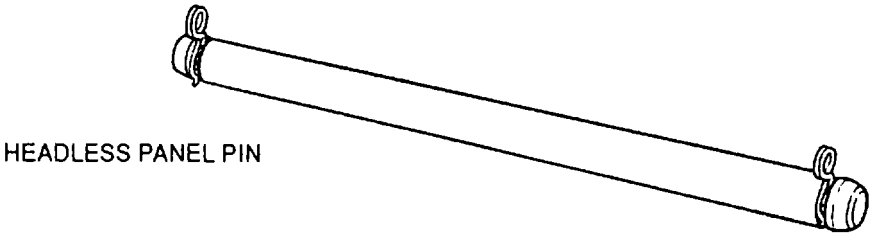
(12) Headless Panel Pin

The headless panel pin is similar to the panel pin except that it has no shoulder and it is slotted at both ends. Being slightly longer and headless, it has a longer reach through component pin jaws.

In the 9 thru 12 bay single story bridge, the headless panel pin is used to connect the top panels of the second and third bay so that the launching nose cross girder posts can be secured at this point.

In the double story bridge, the headless panel pin is used in:

* the post hole on the junction panel for connection of the launching nose cross girder post.
* the pin jaws of the first bay top panel connecting it to the junction panel.
* the top hole of the launching nose link to secure the second story nose to the first story.

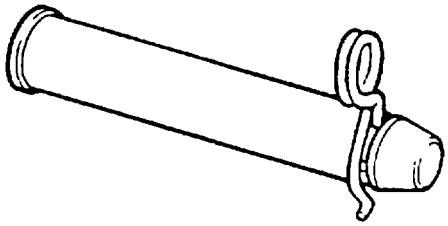


(13) Bracing Pin

Used to connect sway braces to sway brace brackets and to connect the push bar to the push bar adapter and push bar cross girder. The bracing pin is also used on the panel erection aid.

NOTE

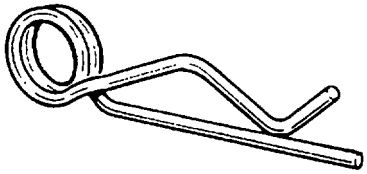
The pin used In the fork end anchors of the LRS anchor assemblies is the only pin that can be hammered on. These pins may be hammered into place using the plastic faced hammer that is provided in the set.



BRACING PIN

(14) Retainer Clip

Retainer clips are inserted through the hole at the end of all pins for safety. It is good practice to clip all pins, even though it is not essential when connecting bottom panel to top panel.

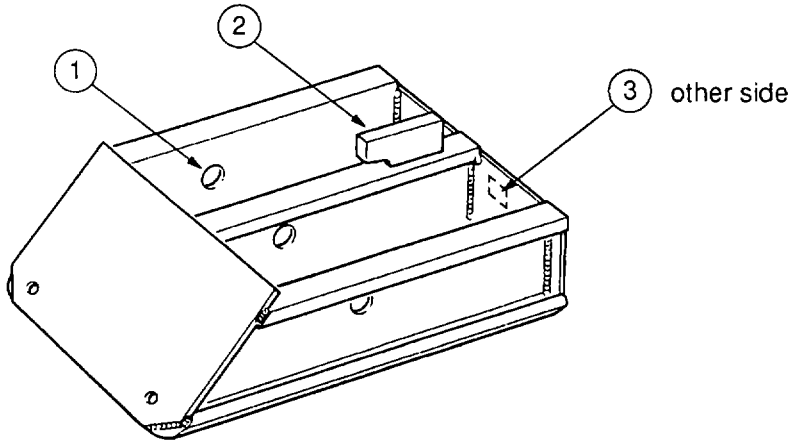


RETAINER CLIP

b. Erection and Launch Components. The erection and launch components are illustrated and the function of each is explained.

(1) Baseplate, Single Story

The baseplate is used under the fixed supports as a base for the roller beam, and with the jack supports as a base for the hydraulic jack. The baseplate can be placed on timber 3 in x 8 in x 36 in (75 mm x 200 mm x 900 mm), or on deck unit packing. The sloping edge always faces the gap.



SINGLE STORY
BASEPLATE

(1) NOSE PIN HOLES. For placement of nose pin used to connect jack support to baseplate.

(2) LUG. Holds fixed support in position.

(3) IDENTIFICATION PLATE. The component serial number is marked on this plate.

(2) Baseplate, Double Story

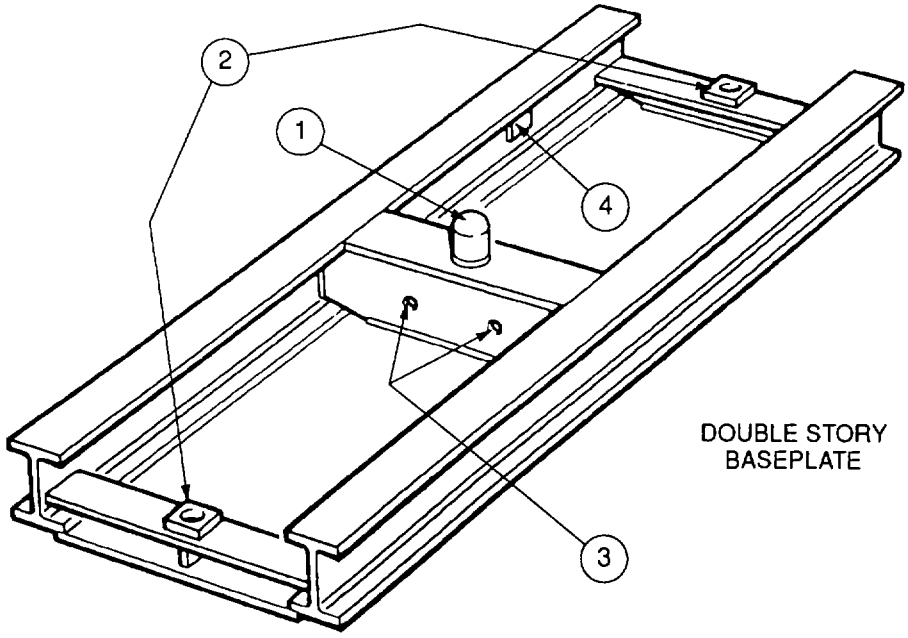
The baseplate is used under the adjustable support as a base for the roller beam, with jack supports as a base for the hydraulic jack to raise or lower bridge, and under the davit post assembly as a base for raising or lowering the bridge. It can be placed on timber 3 in x 8 in x 36 in (75 mm x 200 mm x 900 mm) packing.

(1) BALL. The ball is a pivoting point for the adjustable support. It takes the bridge load from the roller beam and distributes it through the baseplate.

(2) LEVELLING SCREW HOLES. Used for positioning of leveling screws in upright position.

(3) NOSE PIN HOLES. For placement of nose pin used to connect jack support.

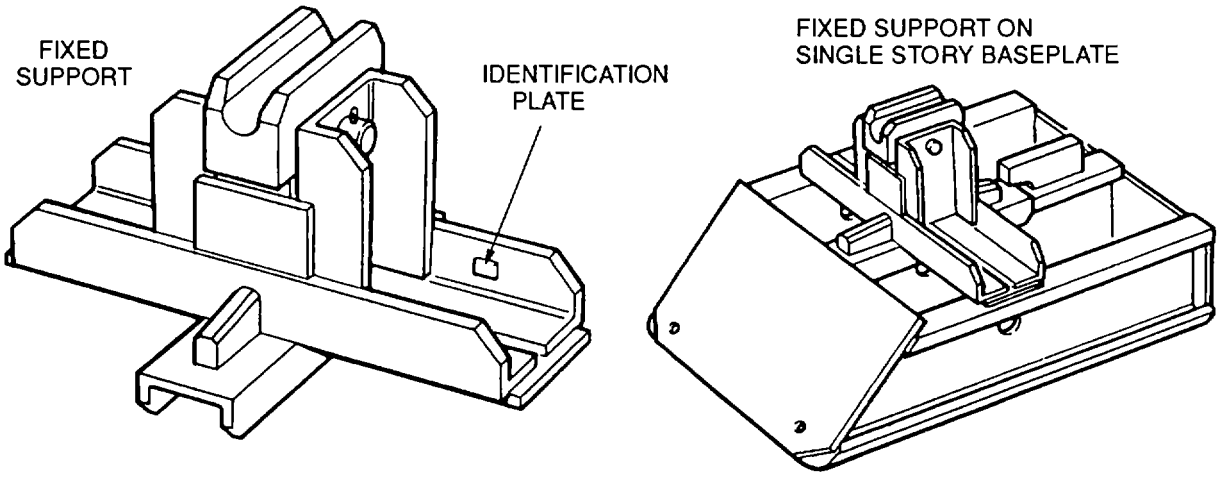
(4) IDENTIFICATION PLATE. The component serial number is marked on this plate.



DOUBLE STORY
BASEPLATE

(3) Fixed Support

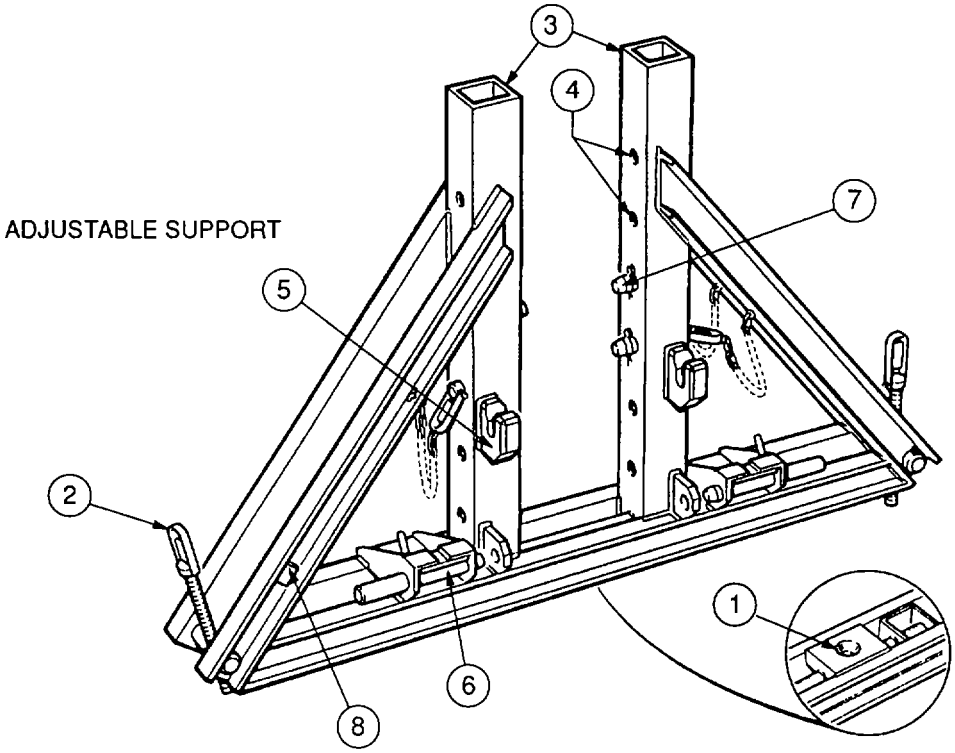
The fixed support, when placed in the single story baseplate, supports the roller beam in the assembly of a single story bridge. The pivoting head permits the roller beam to rock back and forth as needed under the bridge during booming, launching and delaunching.



(4) Adjustable Support

The adjustable support is used in the construction of double story and link reinforced bridges, and supports the roller beam and bridging capsill. It also permits adjustment in the roller beam's height and slope.

In the posts of the adjustable support there are six support pin holes the centers of which are 5 1/2 in (140 mm) apart. These holes are used to support the roller beam/capsill and jack seat during raising and lowering of the beam to various heights. Leveling screws are adjusted to allow the adjustable support to rock 1/4 in (6 mm) in either direction.



(1) BALL JOINT. Used as pivoting point for adjustable support. Takes load of roller beam and distributes through the baseplate.

(2) LEVELLING SCREWS. Used to level adjustable support. Screws should be adjusted to bring the posts as close to vertical as is possible, but with a 1/4 in (6 mm) gap between one leveling screw and the baseplate screw hole.

(3) POSTS. Guides in which the roller beam/capsill can be moved up or down.

(4) SUPPORT PIN HOLES. Used to position roller beam and jackseat at different heights.

CAUTION
Jackseat must not be placed on pins in holes 4, 5, or 6.

(5) HOOKS. For connecting upper part of cross girder to support.

(6) SHOOT BOLTS. For connecting bottom part of cross girder to support.

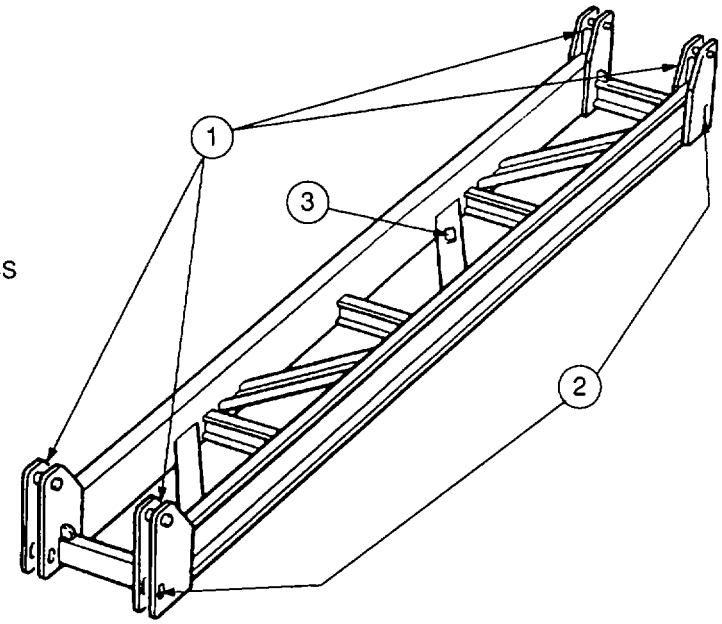
(7) SUPPORT PINS. Two pins on each side of support permit changing height of roller beam/capsill and jack seat.

(8) IDENTIFICATION PLATE. The component serial number is marked on this plate.

(5) Frame Cross Girder

The frame cross girder is used to space and maintain distance between adjustable supports.

FRAME CROSS GIRDER



(1) DOWEL. Fits in hooks on post of adjustable support.

(2) SHOOT BOLT HOLES. Shoot bolts of adjustable support go through these holes to lock girder to support.

(3) IDENTIFICATION PLATE. The component serial number is marked .on this plate.

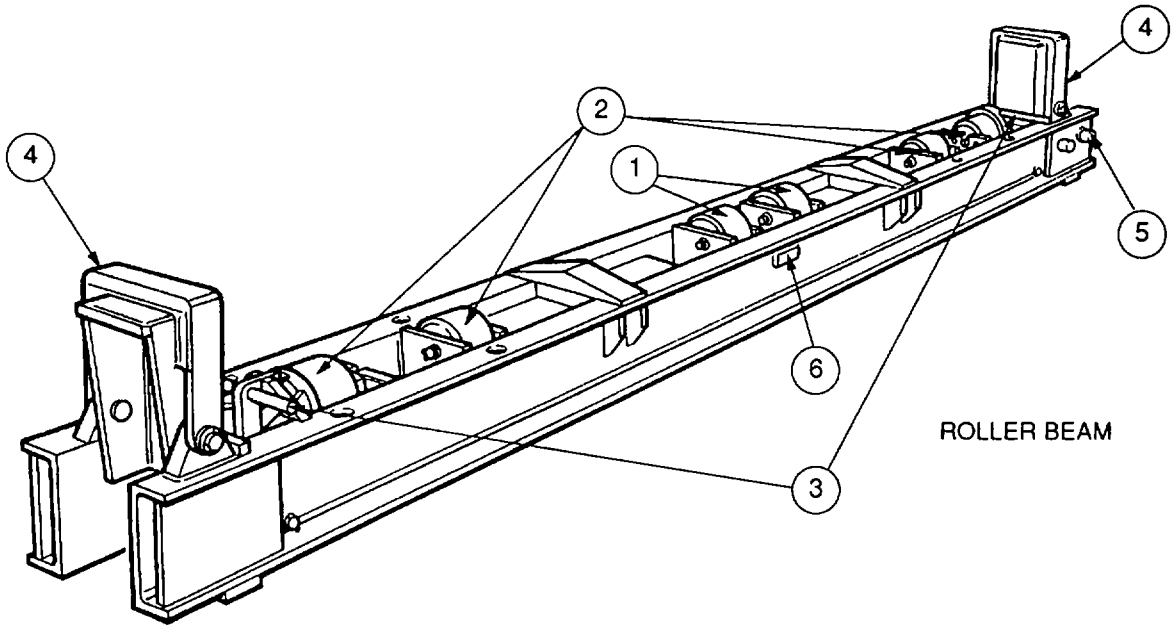
(6) Roller Beam (RB)

The roller beam allows the bridge to be boomed (moved) when needed during construction, and is required for the building of any MGB, regardless of length.

Roller beam is placed on fixed supports for single story, or in adjustable supports for double story and linked reinforced bridges. Ideal conditions (perfectly level ground) will permit placement of the roller beam on the ground or timber packing.

WARNING

Roller catches MUST NOT be engaged when the bridge is moving over the roller beam, otherwise damage to the bridge and roller beams will occur and the roller beam could tip over.



ROLLER BEAM

(1) CENTER ROLLERS. Permits light launching nose and bankseat beam to ride over roller beam during single story construction.

(2) OUTER ROLLERS. During MGB construction bridge girders roll over two pairs of outer rollers. The outer roller of each pair is flanged and slotted so that the roller can engage with the roller catch and be locked.

(3) ROLLER CATCH. Used to lock outer flanged rollers.

(4) JACK HOOD. Used in double story construction for placement of hydraulic jack head.

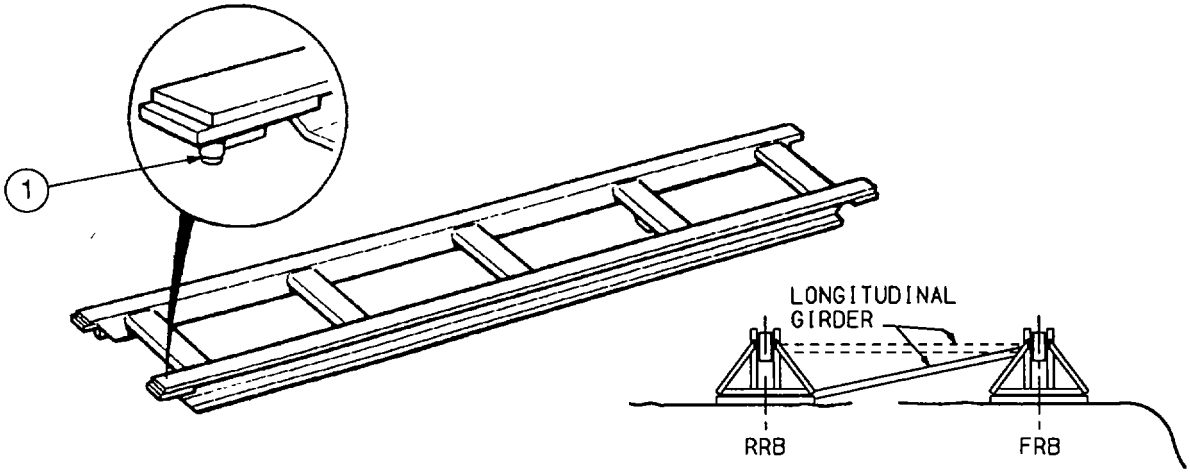
(5) PINS, FIXED AND RETRACTABLE. Used to hold roller beam in adjustable support.

(6) IDENTIFICATION PLATE. The component serial number is marked on this plate.

(7) Longitudinal Girder

Two longitudinal girders are used to position the rear roller beam 15 ft from the front roller beam and ensure that both roller beams are parallel to each other. The girder also assists in the assembly/disassembly of the end of bridge.

The dowels at the end of the girder are inserted in the holes in both roller beams. When the roller beams are finally positioned the longitudinal girders remain located in the front roller beam but are removed from the rear roller beam and lowered to the ground ready to assist in assembly/disassembly of the end of bridge.

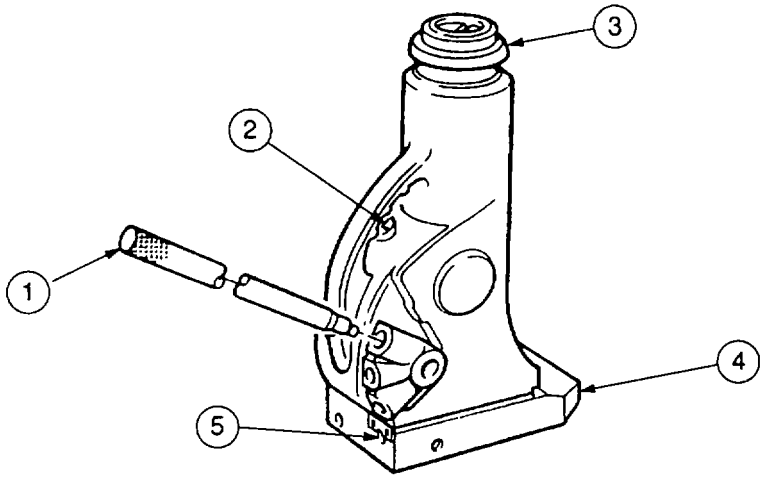


(1) DOWELS. Used to locate the longitudinal girder in the roller beams.

(8) Hydraulic Jack 15T & 20T

The hydraulic jack 15T is used in the construction of all single story, and double story MGB's with and without link reinforcement, in the adjustable supports to level the roller beam. It is also used in the landing roller pedestal Mk 1 for single story MGB and double story MGB without link reinforcement.

The hydraulic jack 20T is used in the landing roller pedestal Mk 2 on double story MGB's with link reinforcement. The jack is identified by its data plate, and silver grey paint.



(1) HANDLE. Used to operate jack to raise ram.

(2) FILLER CAP/DIPSTICK. Used for filling/topping up jack with hydraulic fluid, and for checking fluid level.

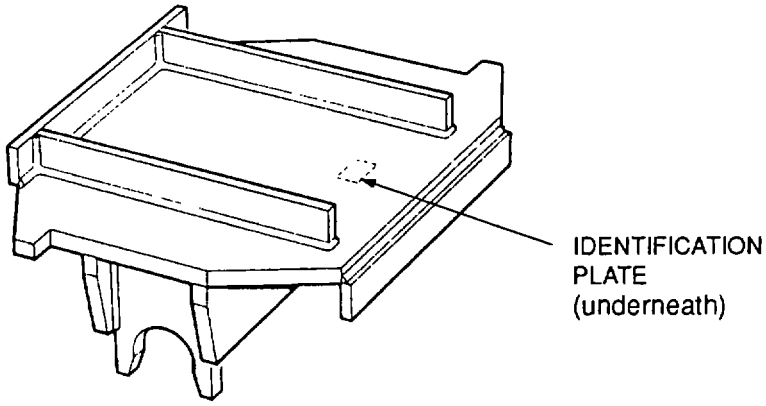
(3) HEAD. Used to position jack in jack hood of roller beam, in lifting bracket of jackpost, and in saddle of landing roller pedestal.

(4) BASE. Used for supporting jack in jack support, and in jackseat of landing roller pedestal.

(5) RELEASE VALVE. Used to lower jack ram. Use the hexagon head on the end of the jack handle to operate the release valve.

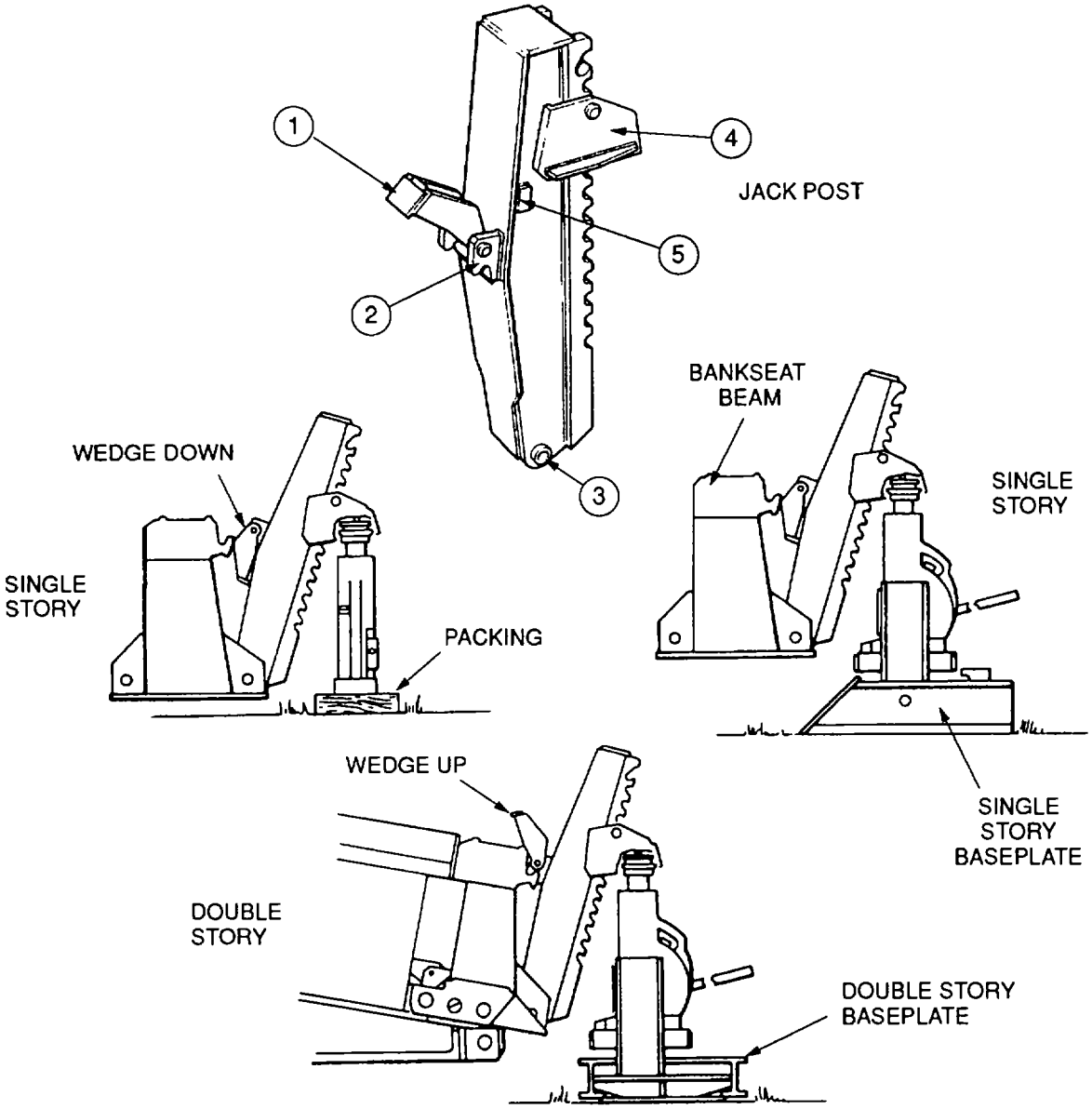
(9) Jack Seat

The jack seat is used to support the jack in the adjustable support. The jack seat is placed on support pins or capsill pin to change the height of the jack. The open end of U-shaped ridge on top of the jack seat faces toward the outside of the adjustable support.



(10) Jack Post

The jack post is connected to the jack post brackets on the bankseat beam to provide an adjustable bracket for jacking the bridge up or down.



WARNING

DO NOT place bracket in top notch and try to raise bridge with jack. Serious injury to personnel and damage to bridge may occur.

(1) WEDGE. Used between jack post and bankseat beam as a spacer to provide more clearance for the jack in single story construction.

(2) HOOK. Connects post to ramp shelf on bankseat beam in double story construction.

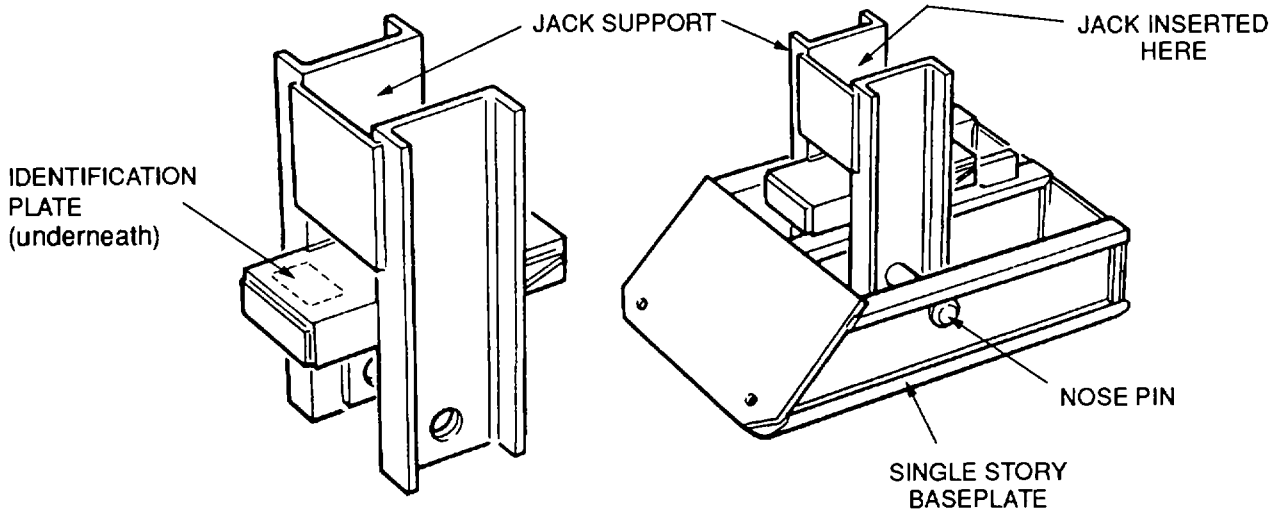
(3) NOSE PIN HOLE. For insertion of a nose pin to secure bottom of post to jack post bracket on bankseat beam.

(4) JACK HOOD. Movable hood for positioning of hydraulic jack.

(5) IDENTIFICATION PLATE. The component serial number is marked on this plate.

(11) Jack Support

The jack support is used to support the jack on single or double story baseplates during jacking of the bridge.



(12) Light Launching Nose, Front and Rear Sections

These sections are used as a complete launching nose for 4 thru 8 bay single story and as the first two nose sections of launching noses on 9 thru 12 bay single story, and 1 thru 22 bay double story and link reinforced bridges.

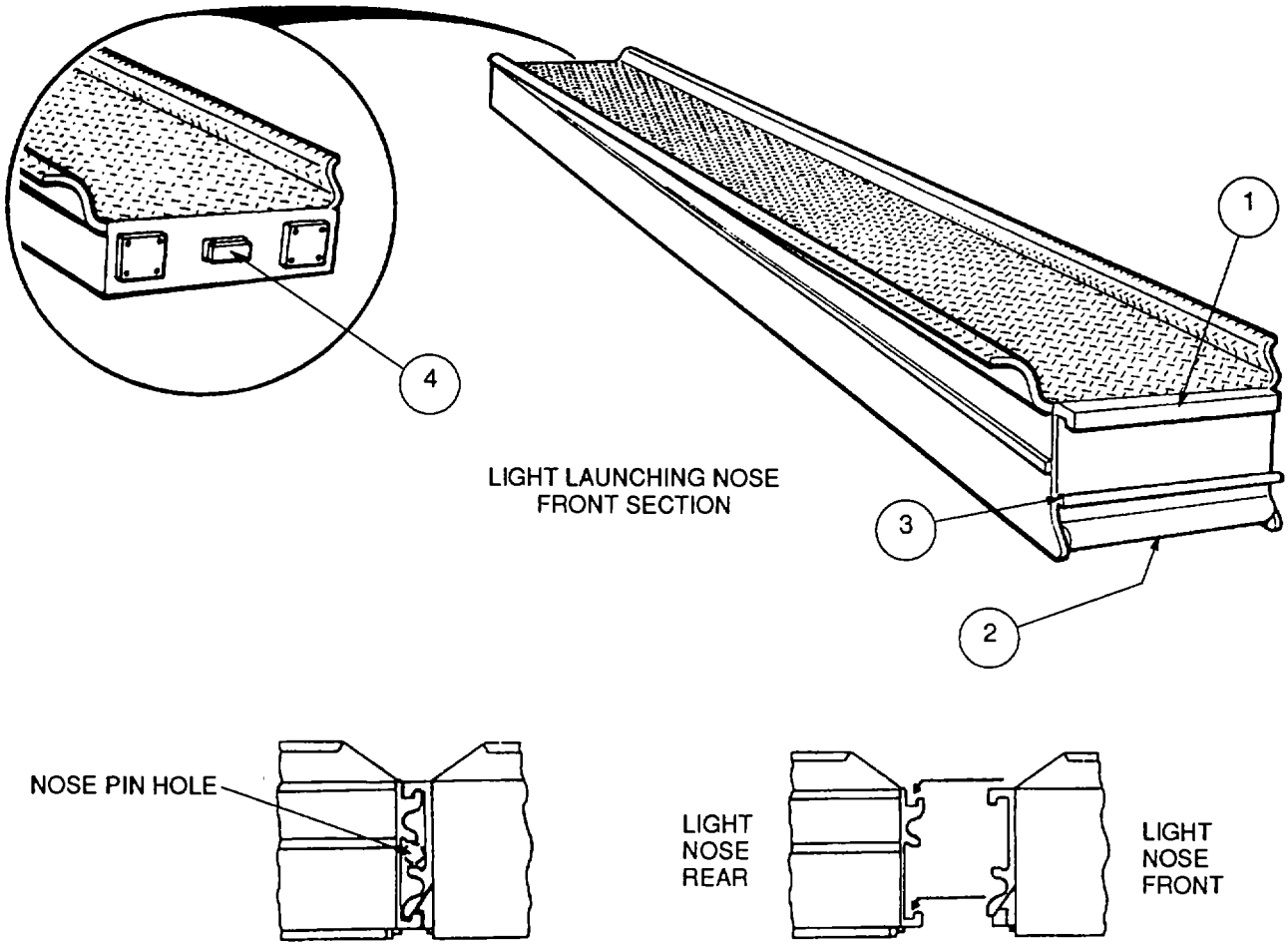
(a) Front Section

(1) TOP RAIL. Hooks over top rail of rear nose section.

(2) BOTTOM RAIL. Hooks over bottom rail of rear nose section.

(3) CENTER LUG. With center lug of rear section, forms nose pin slot.

(4) IDENTIFICATION PLATE. The component serial number is marked on this plate.



(b) Rear Section

(1) TOP RAIL. Mates with top rail of front nose section.

(2) BOTTOM RAIL. Mates with bottom rail of front nose section.

(3) CENTER LUG. With center lug of front section, forms nose pin slot.

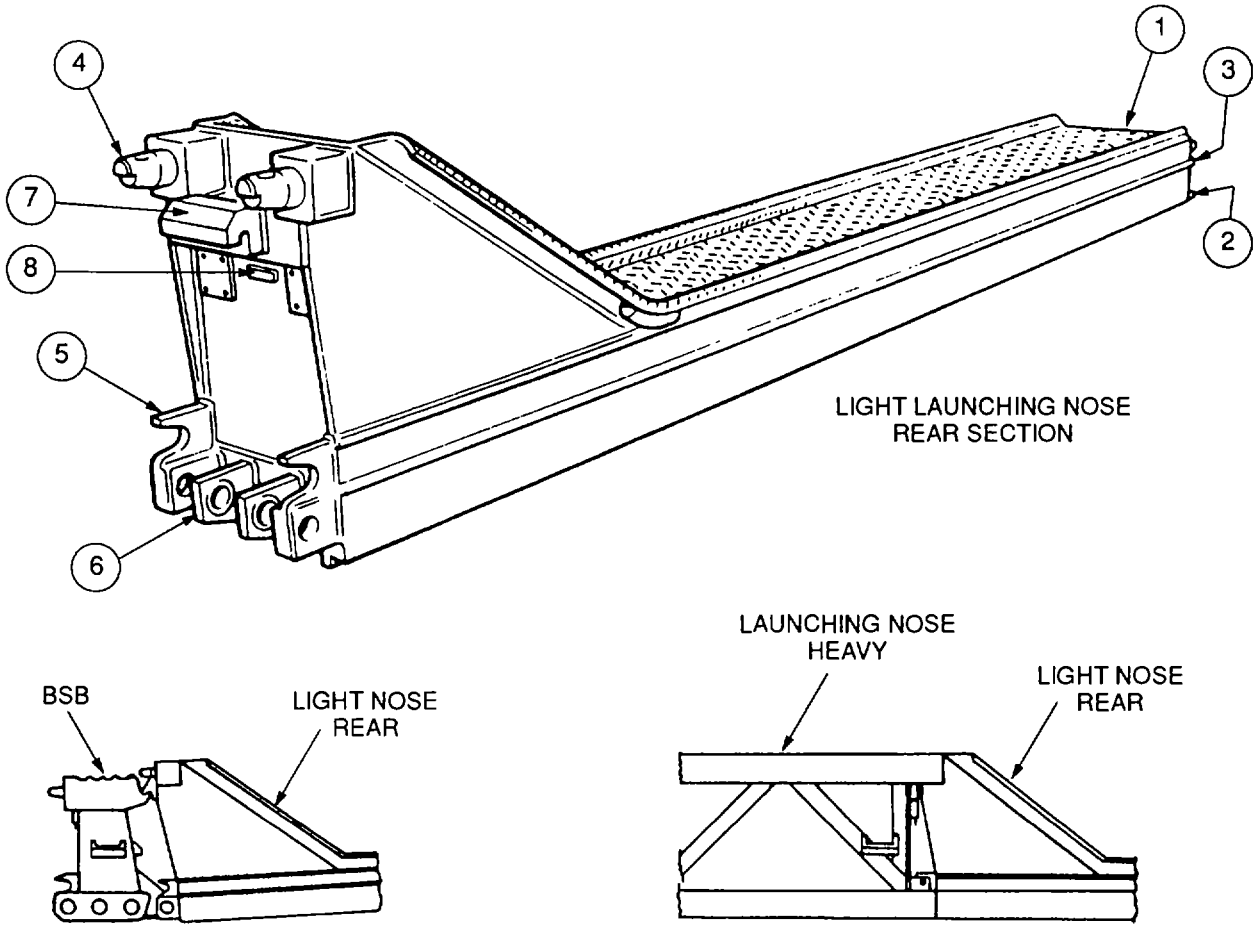
(4) DOWELS. Used to line up nose section with heavy launching nose section.

(5) GUIDE SLOTS. Used to line up pin jaws so nose pin can be inserted by hand.

(6) PIN JAWS. Takes tension load when connected by nose pin to bankseat beam or another nose section.

(7) CENTER HOOK. Connects to ramp shelf on bankseat beam in 4 thru 8 bay single story construction.

(8) IDENTIFICATION PLATE. The component serial number is marked on this plate.



(13) Launching Nose Heavy (LNH)

The launching nose heavy forms the main part of the launching nose needed for 9 thru 12 bay single story, and all double story and link reinforced bridges.

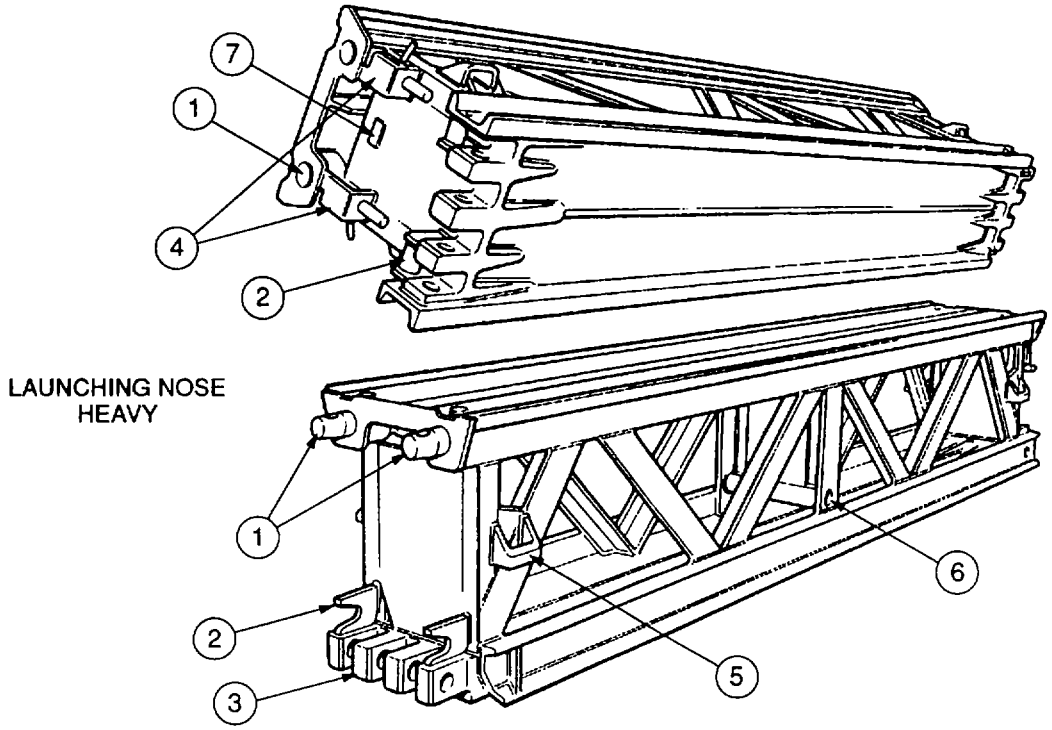
(1) DOWELS AND SOCKETS. Used to line up nose sections for connection to each other.

(2) RESILIENT MOUNTS AND GUIDE SLOTS. Used to line up pin jaws so nose pin can be inserted by hand.

(3) PIN JAWS. Takes tension load when connected by nose pin to another nose section.

(4) SHOOT BOLTS. Locks and holds top of nose section to another section during construction.

(5) CARRYING BAR BRACKETS. For connection of carrying bars used to carry panel. Two brackets on each side.



(6) ANCHORAGE TUBE. For insertion of panel pin used to secure launching nose to nose roller and the launching nose link on a double story launching nose.

(7) IDENTIFICATION PLATE. The component serial number is marked on this plate.

(14) Launching Nose Roller (LNR)

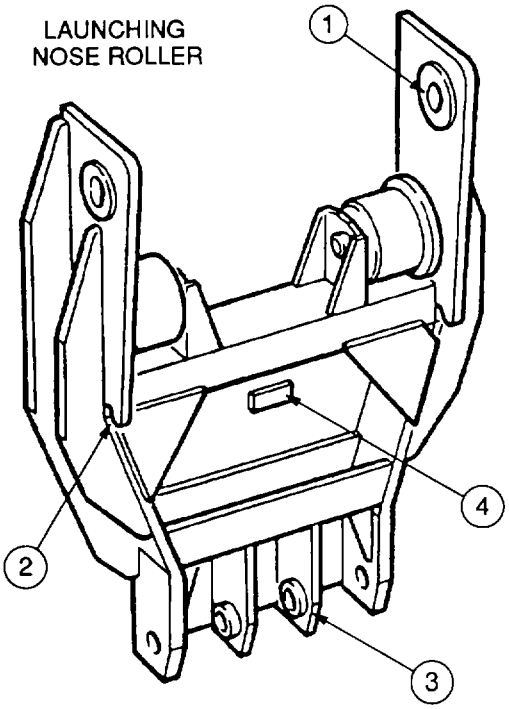
The launching nose roller is connected to the bankseat beam and permits movement of the launching nose during construction. It also provides support and an anchorage point for the launching nose, during and at completion of construction.

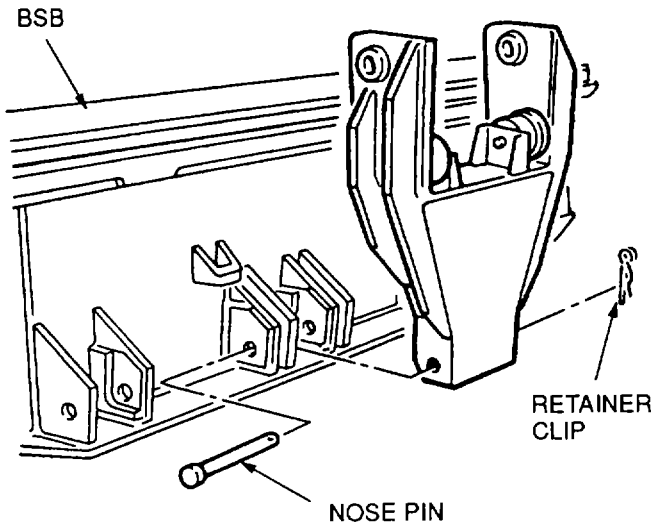
(1) ANCHORAGE HOLES. For insertion of panel pin to secure nose to roller.

(2) RAMP SHELF HOOKS. For connection of roller to ramp shelf of bankseat beam.

(3) PIN JAWS. Connects bottom of nose roller to center bracket of bankseat beam with launching nose pin.

(4) IDENTIFICATION PLATE. The component serial number is marked on this plate.





(15) Launching Nose Cross Girder Post

The launching nose cross girder post is used to connect the cross girder to the bridge, and to permit positioning of the cross girder in any one of eight positions.

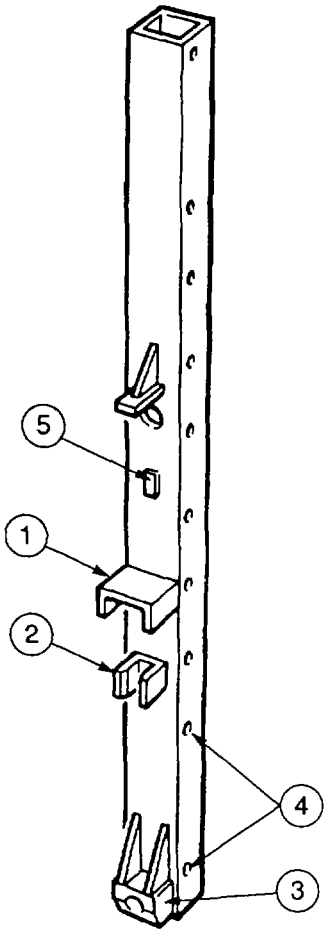
(1) TOP LUG. Connects to lug on junction panel.

(2) CENTER LUG. Connects to compression faces of two top panels in single story construction.

(3) BOTTOM LUG. For connection of post to bottom of top panels or junction panel. Headless panel pin is always used to connect bottom of post to panel.

(4) PIN HOLES. For insertion of captive pins to secure cross girder to posts.

(5) IDENTIFICATION PLATE. The component serial number is marked on this plate.



WHITE STRIPE (FOR MULTI–SPAN BRIDGES)
HOLES NUMBERED 3, 5, 7, 9 AND 10
(FROM BOTTOM UP)

NOT USED ON U.S. MGB

YELLOW STRIPE (FOR DS BRIDGES)
HOLES NUMBERED 2, 4, 6 AND 8
(FROM BOTTOM UP)
HIGH POSITION 6 – BETWEEN HOLES 6 AND 8
MID POSITION 4 – BETWEEN HOLES 4 AND 6
LOW POSITION 2 – BETWEEN HOLES 2 AND 4

BLACK STRIPE (FOR SS BRIDGES)
HOLES NUMBERED 1, 2, 4 AND 6
(FROM BOTTOM UP)
HIGH POSITION 4 – BETWEEN HOLES 4 AND 6
MID POSITION 2 – BETWEEN HOLES 2 AND 4
LOW POSITION 1 – BETWEEN HOLES 1 AND 2

10	W
9	W
8	Y
7	W
6	B/Y
5	W
4	B/Y
3	W
2	B/Y
1	B

LAUNCHING NOSE CROSS GIRDER POST

(16) Launching Nose Cross Girder (LNCG)

The launching nose cross girder is used to hold the near bank end of the launching nose in the position set for construction and launch.

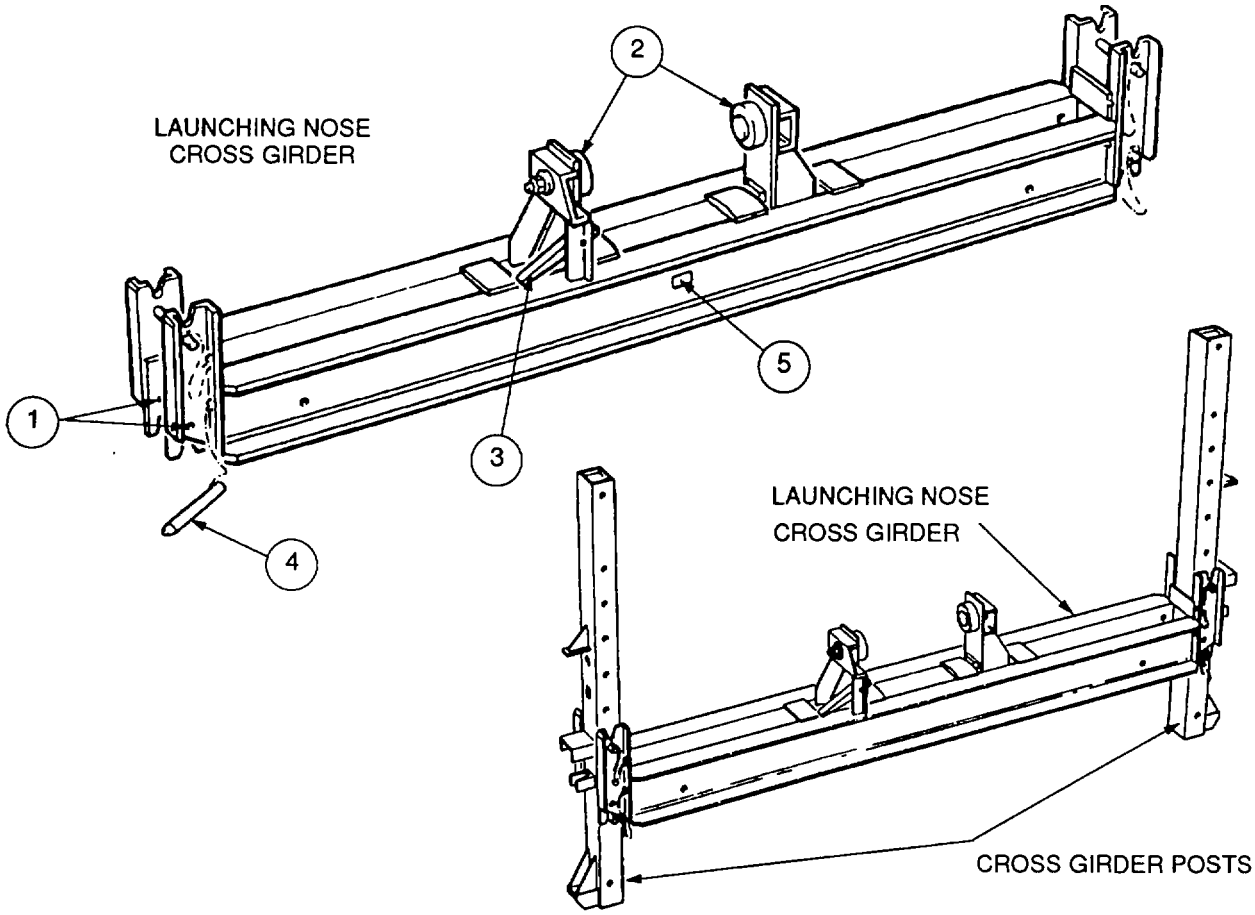
(1) PIN HOLES AND JAWS. For insertion of captive pins to secure girder to posts.

(2) ROLLERS. Bottom rail of heavy launching nose sections will run under rollers.

(3) GRAVITY CATCH. Used to prevent over-launching of nose during construction.

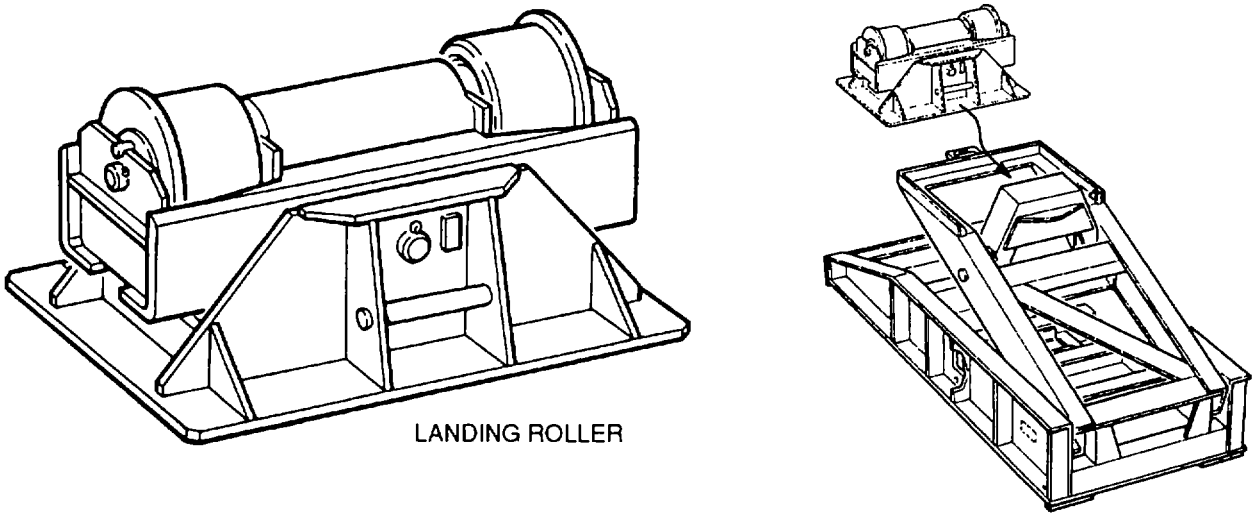
(4) CAPTIVE PINS. Used to secure girder to posts. Retainer clips must be used in captive pins.

(5) IDENTIFICATION PLATE. The component serial number is marked on this plate.



(17) Landing Roller (LR)

The landing roller is used on the far bank to receive the launching nose. It can be used on the ground for 4 thru 8 bay single story, or on the landing roller pedestal for 9 thru 12 bay single story and 1 thru 22 bay double story bridges.

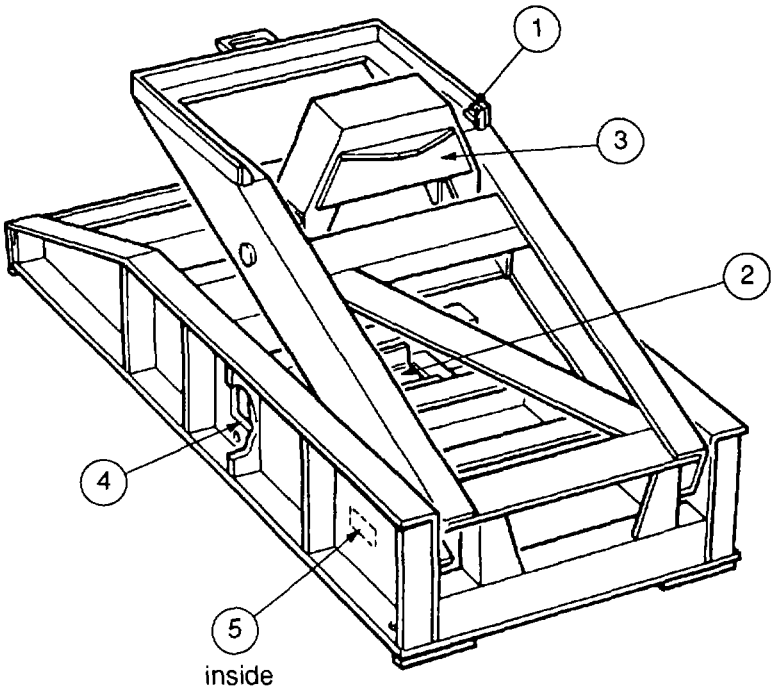


(18) Landing Roller Pedestal Mk1 (LRP)

The landing roller pedestal holds the landing roller and receives the launching nose on the far side of the gap. It is used in 9 thru 12 bay SSB's and 1 thru 22 bay DSB's. The height of the roller pedestal is adjusted with a hydraulic jack 15T.

WARNING

Use extreme care when the pedestal is being raised or lowered. DO NOT use any other opening in pedestal as a point to operate jack. DO NOT Insert hand in access hole. Use the jack handle only to operate the jack. Failure to follow these Instructions will result In serious bodily injury.



LANDING ROLLER
PEDESTAL Mk 1

(1) LUGS. Hold rear of landing roller in position.

(2) JACK SEAT. Base for 15T hydraulic jack used to adjust height of upper frame. Pivot mounted to keep jack seated in frame during operation.

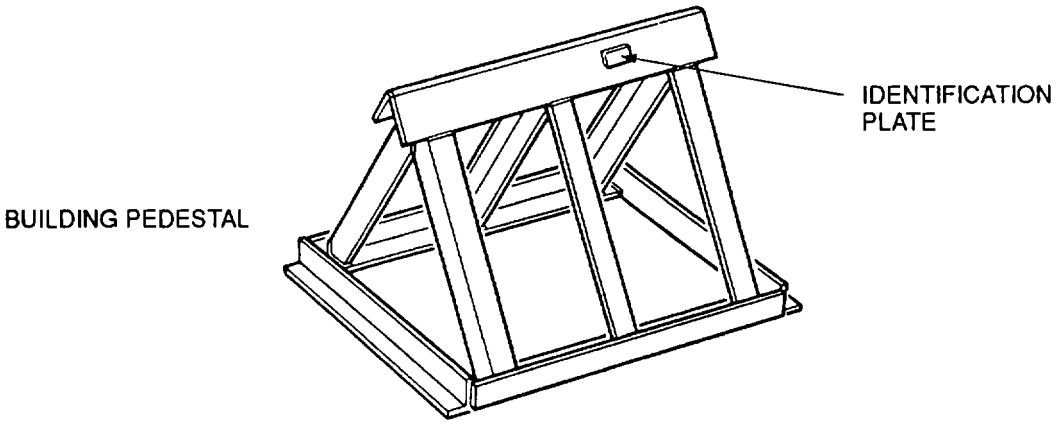
(3) SADDLE. Fits head of jack. Pivot mounted to keep saddle on jack head during operation.

(4) ACCESS HOLES. For safe operation of hydraulic jack.

(5) IDENTIFICATION PLATE. The component serial number is marked on this plate.

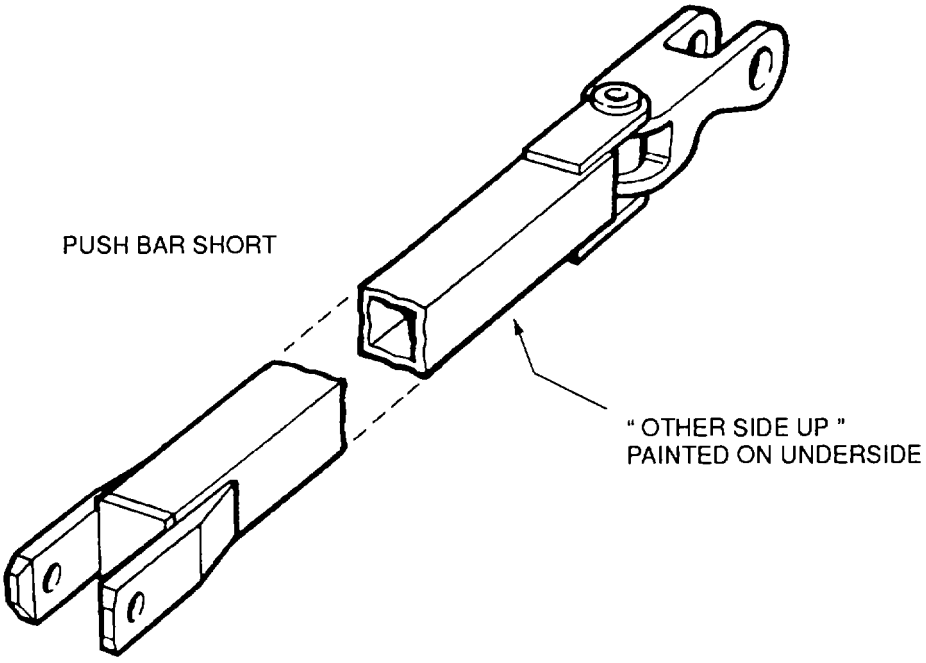
(19) Building Pedestal (BP)

The building pedestal is used under the girders to keep the bridge off the ground during construction of all single story bridges.



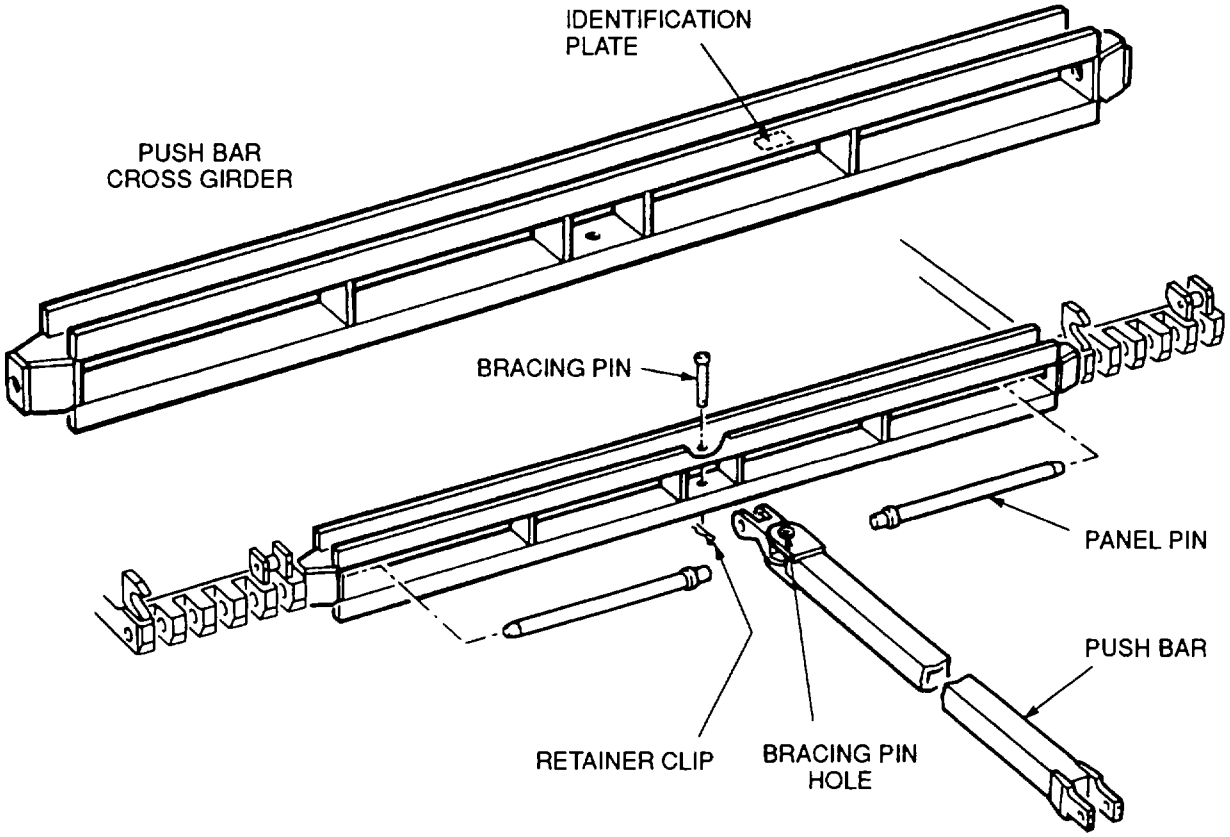
(20) Push Bar Short

The push bar short is used to boom and launch bridges over 8 bay single story. It is also used to boom and launch double story bridges over 8 bays long, and to connect the truck to the davit post.



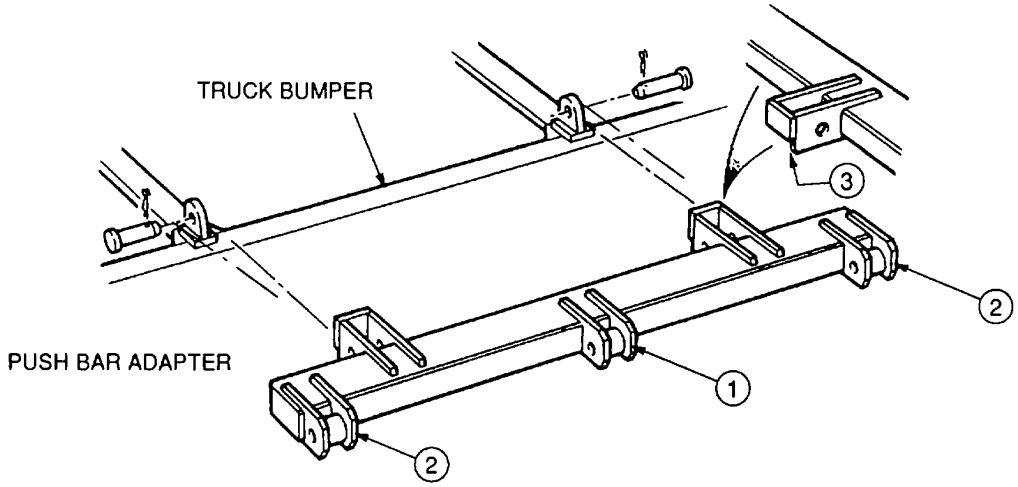
(21) Push Bar Cross Girder (PBCG)

The push bar cross girder is used to connect the push bar to the bridge, to enable the bridge to be boomed during construction.



(22) Push Bar Adapter

The push bar adapter is used to connect the push bar to the bumper of the truck.



(1) CENTER LUG. For connection of push bar used to boom, launch or skid bridge.

(2) OUTER LUGS. For connection of push bars used with davit posts.

(3) NOTCH. Adapter must always be fitted with notch facing down.

(23) Launching Nose Pin

The launching nose pin is used as follows:

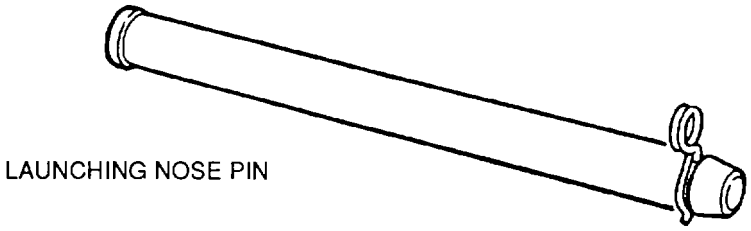
(a) To connect nose sections together.

(b) To connect light rear nose section, nose roller, push bar and jack posts to bankseat beam.

(c) To connect jack support to baseplates.

(d) To connect links to each other and to post tensioning and anchor assemblies.

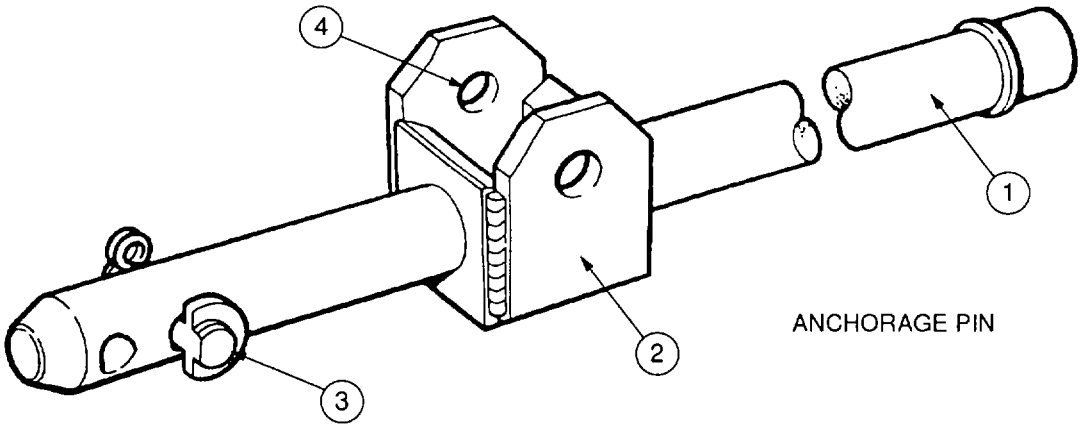
(e) Used in post tensioning assembly to secure post in the transit or tensioned positions.



LAUNCHING NOSE PIN

(24) Anchorage Pin

The anchorage pin is used as an anchor point on the bridge for anchorage cables. The anchorage pin is used instead of a panel pin at the junction of the first and second, last and next to last bays in a single story bridge. In double story and link reinforced bridges, the anchorage pin is placed in the anchorage holes in the end taper panel.



ANCHORAGE PIN

(1) PIN.

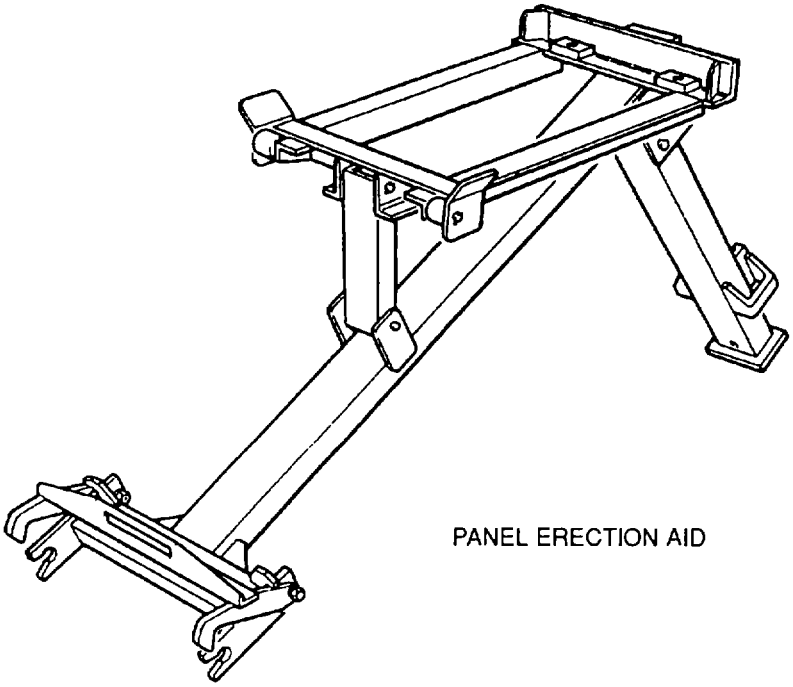
(2) LUG. Used as a housing for a bracing pin which holds the anchorage cable.

(3) RETAINING PIN. Retains the lug and is secured with a retainer clip.

(4) LUG PIN HOLE. For a bracing pin which is used to hold the anchorage cable.

(25) Panel Erection Aid

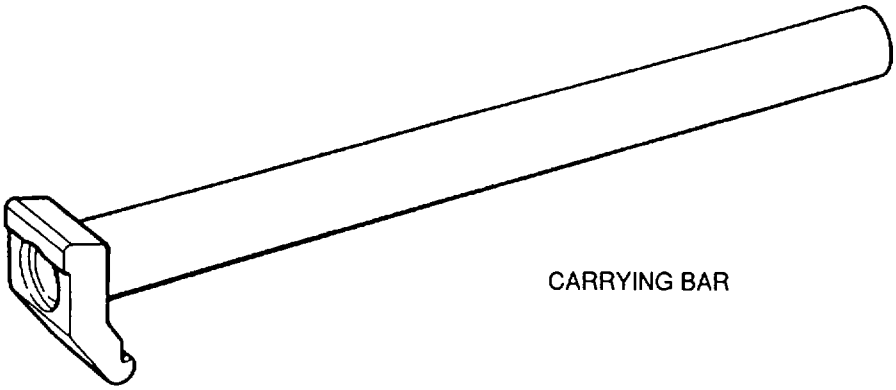
The panel erection aid is used to lift top panels into place in double story bridges if rear end of bridge is too high for personnel to lift top panels.



PANEL ERECTION AID

(26) Carrying Bar

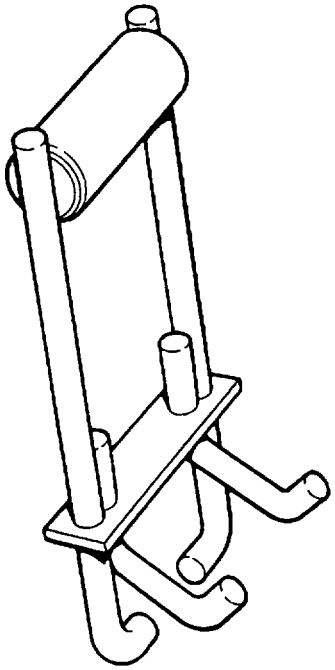
The carrying bar is used to lift and carry all panels, bankseat beam, heavy nose sections, long ramps, and end taper panels. It is also used to lift the panel erection aid.



CARRYING BAR

(27) Carrying Handle

The carrying handle is used to carry deck and ramps.



CARRYING HANDLE

c. Link Reinforcement Components. Each LRS component is illustrated and its function explained. Only the components unique to the LRS are described.

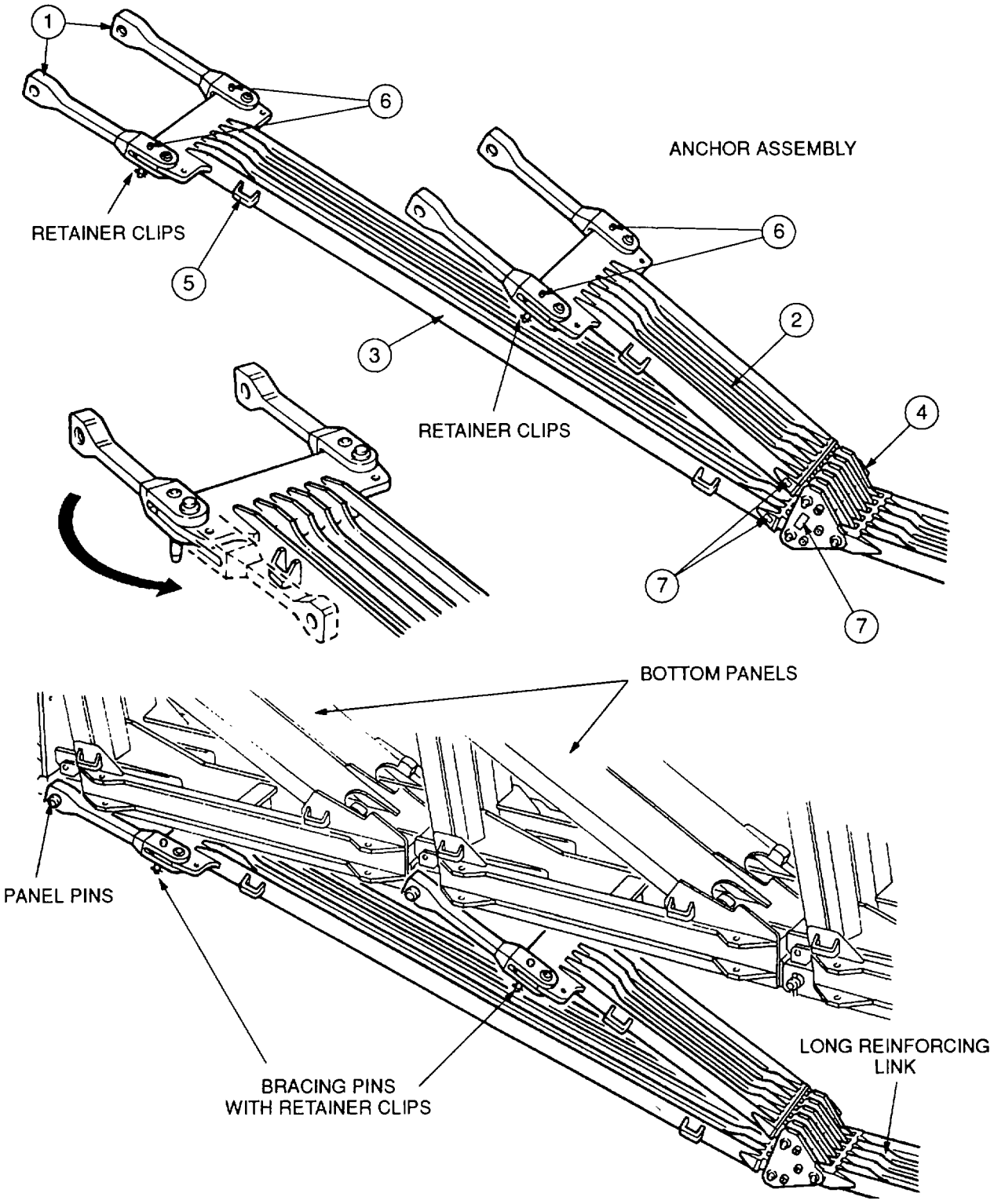
(1) Anchor Assembly (AA)

The anchor assembly anchors the chain of links to two of the bottom panel pins at each end of the bridge. Each anchor assembly is brought to the site assembled with the fork end anchors folded in the transit position, and is carried by four personnel. Do not switch the parts of one anchor assembly with the parts of another.

WARNING

Use extreme care when handling the anchor assembly. It is a multi-hinged component, and serious bodily injury may occur from Improper handling.

To connect the assembly to the bridge, the fork end anchors are swung over the projecting ends of the bottom panel pins and then secured by bracing pins and retainer clips.



(1) FORK END ANCHORS. Connect to the projecting ends of the panel pins in the bottom panels at the ends of the bridge. There are two fork end anchors on each of the two anchor links. The anchors can be secured in either the transit or operational position with bracing pins and retainer clips provided.

(2) LINK ANCHOR SHORT. Takes the tension load from the anchor junction blocks and transfers it to the fork end anchors and the bottom panel pins.

(3) LINK ANCHOR LONG. Takes the tension load from the anchor junction block and transfers it to the fork end anchors and the bottom panel pins.

(4) ANCHOR JUNCTION BLOCK. Connects the link anchors to the long reinforcing link attached to the post tensioning assembly. The block has a guide system built into it which allows the nose pin to be inserted easily when connecting the reinforcing link.

(5) CARRYING BAR BRACKETS. The anchor assembly has six brackets, four on the link anchor long and two on the link anchor short. The two brackets on the link anchor short are used only to position the link for connection to the pins in the bottom panel.

(6) BRACING PINS AND HOLES. For positioning of the fork end anchors in either the transit or operational position. The bracing pins are always inserted from the top of the fork.

CAUTION

Ensure four bracing pins stay with this component. Do not use these bracing pins in any other component.

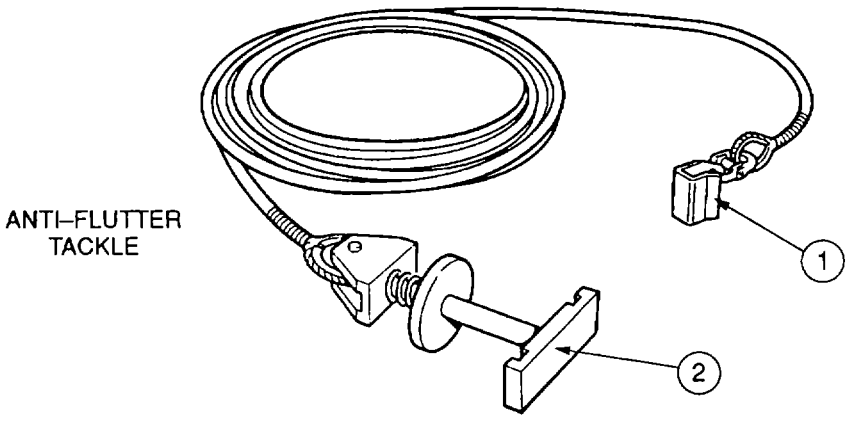
(7) IDENTIFICATION PLATE. The component serial number is marked on this plate.

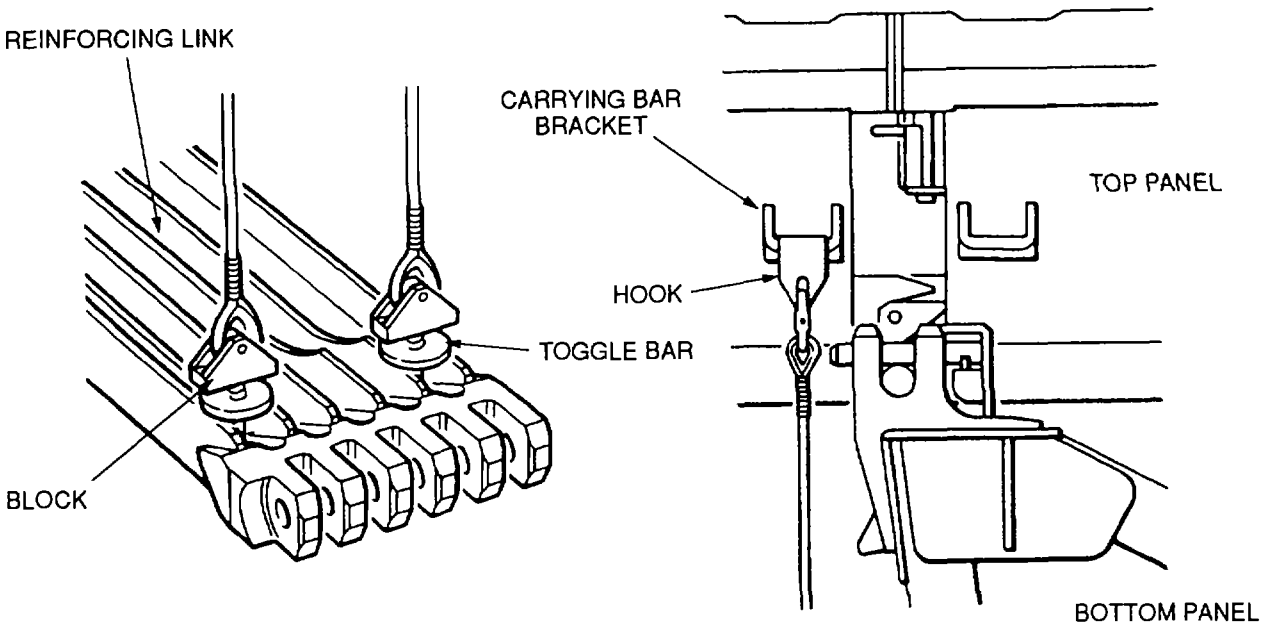
(2) Anti-flutter Tackle

The anti-flutter tackle is used between top panels and reinforcing links to reduce vibrational flutter which may be caused by side winds or crossing vehicles. For all link reinforced bridges, two sets of anti-flutter tackle should be fitted under each girder approximately mid span. Connection is made by inserting the toggle bar into the elongated slot of the link. The block is pushed against the spring and rotated 90o which locks it into position. The hook end is then placed over the carrying bar bracket of the top panel.

(1) HOOK. Connects to the carrying bar bracket of a top panel.

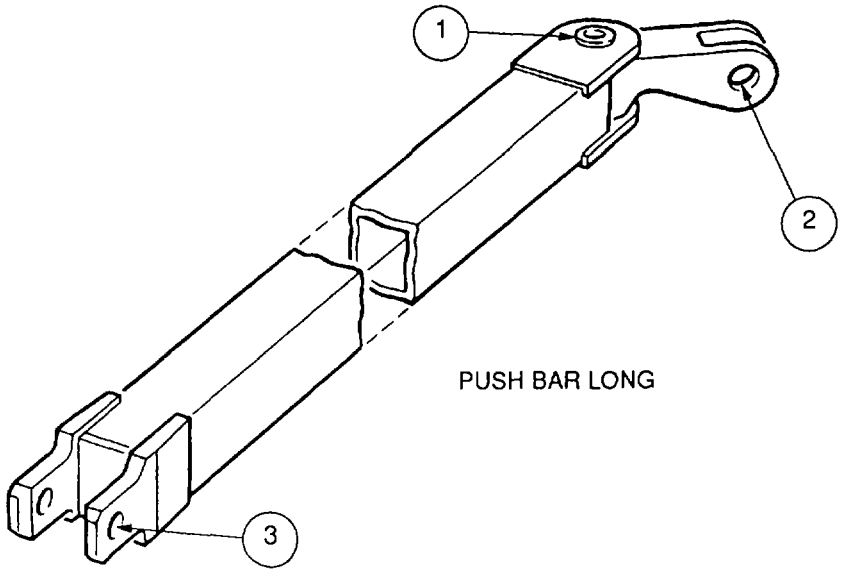
(2) TOGGLE BAR. Connects the lower end of the tackle to the link. It is spring loaded to keep it in the locked position.





(3) Push Bar Long

The push bar long is used to boom and launch all bridges over 12 bays long, and between davit posts, and push bar adapter on truck.

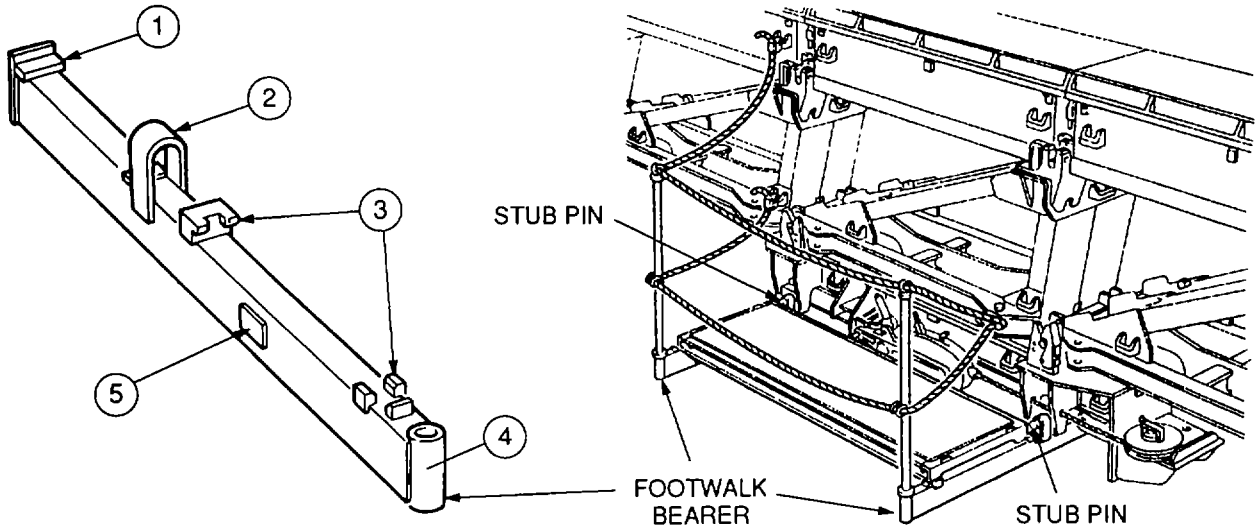


(1) BRACING PIN HOLE. For bracing pin when connecting to push bar and cross girder.

(2) NOSE PIN HOLE. For nose pin when connecting to bankseat beam. Use a bracing pin when connecting push bar to bracket on davit post.

(3) BRACING PIN HOLE. For bracing pin when connecting to push bar adapter on truck.

(4) Footwalk Bearer.



The footwalk bearer is used to support the footwalk section on the post tensioning assembly.

(1) BEARING PAD. Rests against the bottom of the post tensioning assembly.

(2) STUB PIN BRACKET. Locates over the stub pin.

(3) FOOTWALK STOPS. For positioning the footwalk section.

(4) FOOTWALK POST HOLE. For footwalk post.

(5) IDENTIFICATION PLATE. The component serial number is marked on this plate.

(5) Jacking Bracket

The jacking bracket connects to the bankseat beam to provide a lifting point and a support base for the cable pullers. The cable pullers are operated from the bankseat beam to lift or lower the end of the bridge.

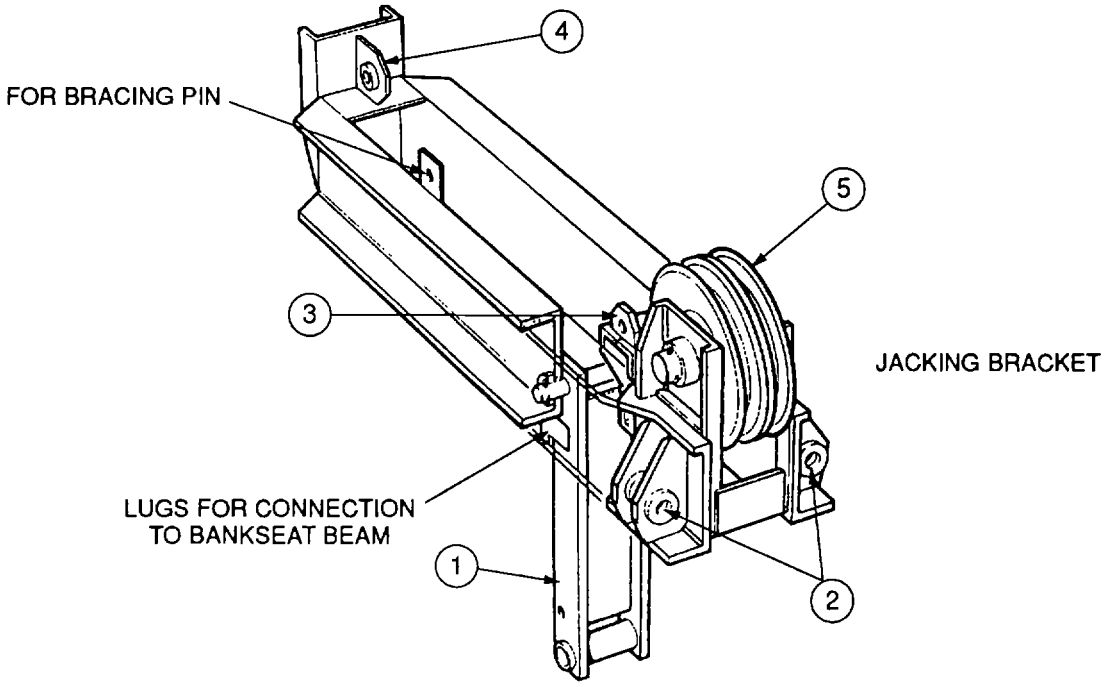
(1) LINK. Pins to bankseat beam with a nose pin, secure with a retainer clip.

(2) SAFETY CHAIN LUGS. For connection of safety chains on davits to jacking bracket. Use a bracing pin and retainer clip to secure chains to brackets.

(3) CABLE LUG. For connection of cable from puller to jacking bracket. Use a bracing pin and retainer clip.

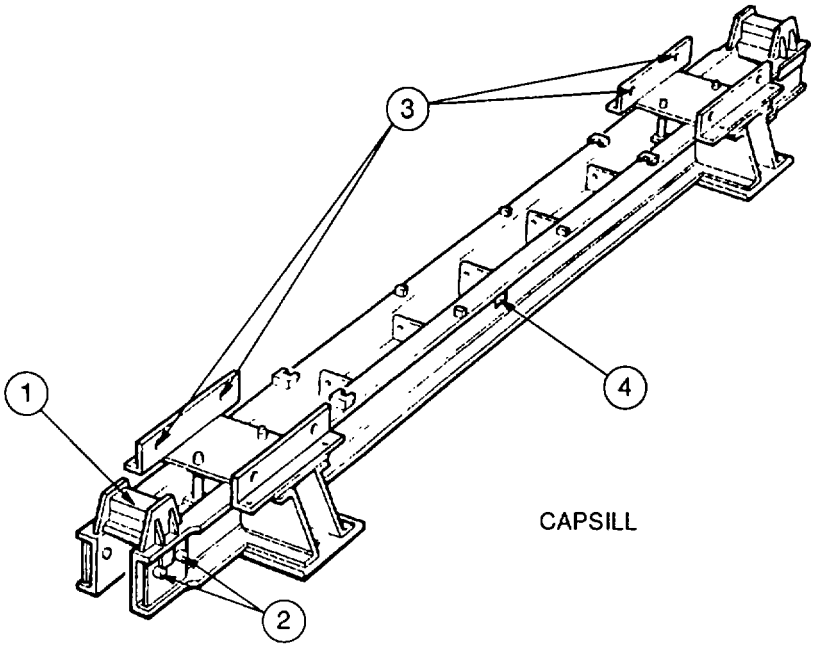
(4) PULLER LUG. For pinning of puller to bracket. Use the anchor pin in the cable puller to secure puller to jacking bracket. DO NOT USE any other type of pin.

(5) PULLEYS. For reeving of puller cables.



(6) Capsill

The capsill is used in the MGB adjustable support and, together with the rocking rollers, forms the heavy duty capsill roller beam (CRB). The CRB is used when constructing 2E + 13 thru 2E + 22 bay double story bridge with or without link reinforcement. The rocking rollers used in the capsill are separate items, and are pinned into the capsill with nose pins and retainer clips. The capsill is carried by six personnel. When rocking rollers are installed, eight personnel are required.



(1) JACK HOOD. For positioning of the jack used to raise or lower CRB. These hoods are fixed, and do not move like the hoods in the roller beam.

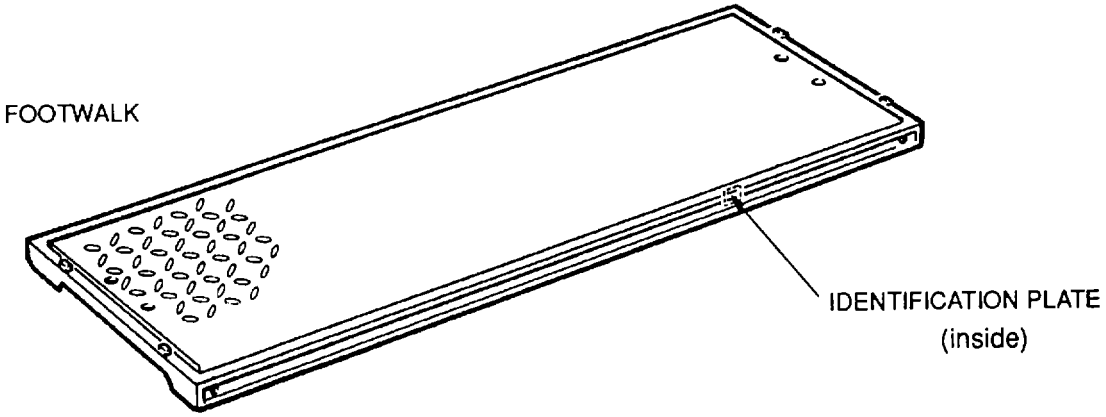
(2) FIXED PINS. These pins hold the capsill into the adjustable support posts.

(3) NOSE PIN HOLES. Nose pins are inserted in these holes to secure rocking roller to capsill.

(4) IDENTIFICATION PLATE. The component serial number is marked on this plate.

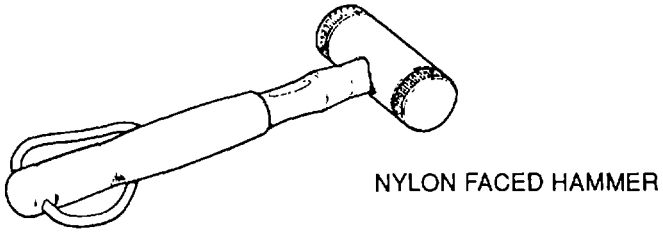
(7) Footwalk

The footwalk is used as a platform for the post tensioning work party to stand on, when operating the cable pullers.



(8) Nylon Faced Hammer

The nylon faced hammer is used on the bracing pins in the fork end anchors, and can be used on other small pins.



(9) Davit Post Assembly

The davit post assembly is used to raise or lower the bridge. Two davits are used at the end of the bridge which allows the bridge to be raised or lowered a maximum or 4.3 ft (1.3 m). The davit is carried by four personnel.

(1) PUSH BAR LUGS. For connection of the short or long push bars from launch vehicle. This vehicle will be used to keep the davit pulleys vertical above the jacking bracket pulleys.

(2) LEVELLING SCREWS. These screws are used to level the davit over the baseplates. Packing can be used under baseplates if screws do not level davits as much as needed.

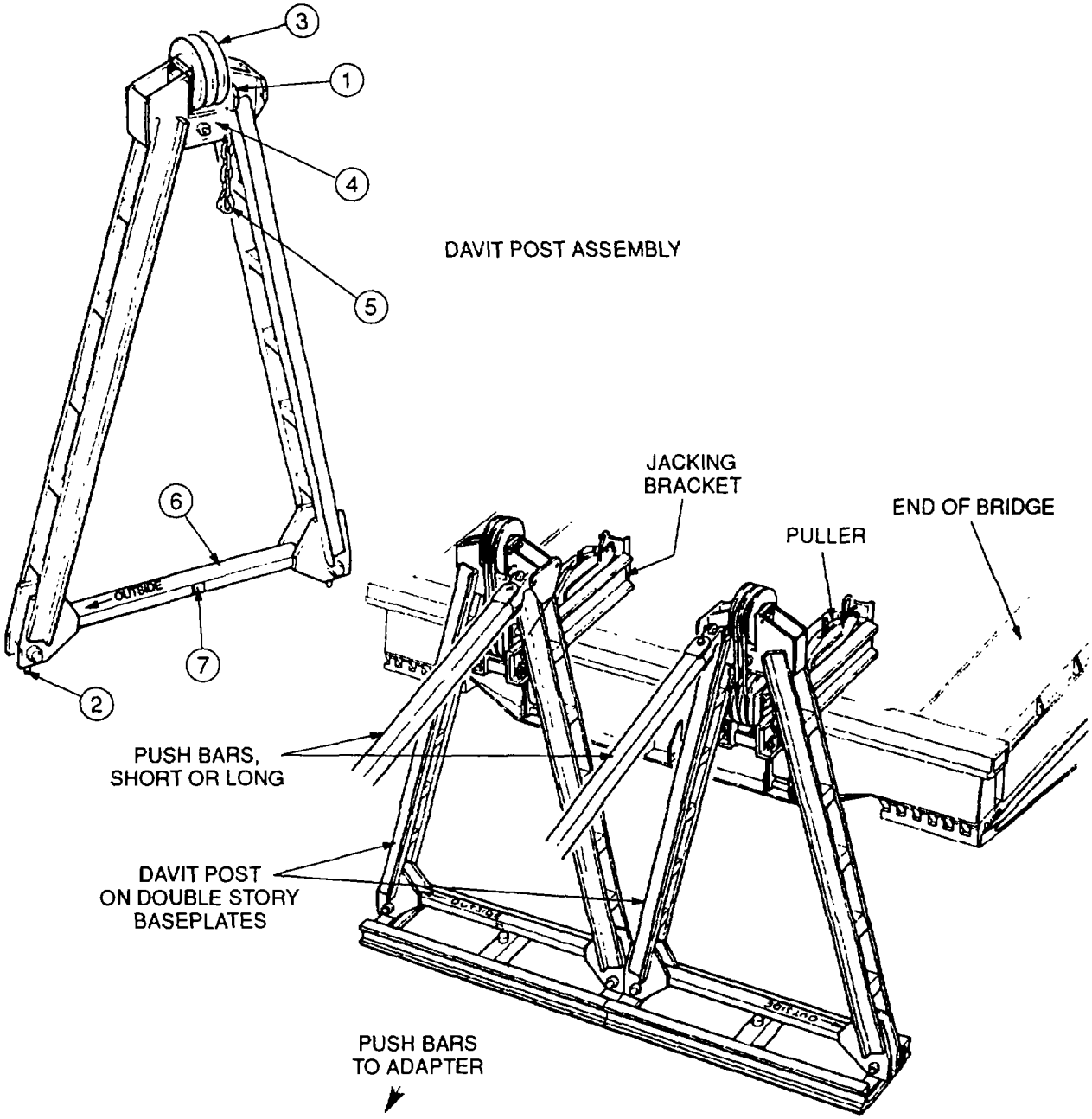
(3) PULLEYS. For reeving of puller cable.

(4) GUSSET PLATE. The connecting plate between the two legs of the davit. During the raising or lowering operation, the cable must be kept free of this plate.

(5) SAFETY CHAINS. These chains are connected to jacking bracket before raising or lowering the bridge.

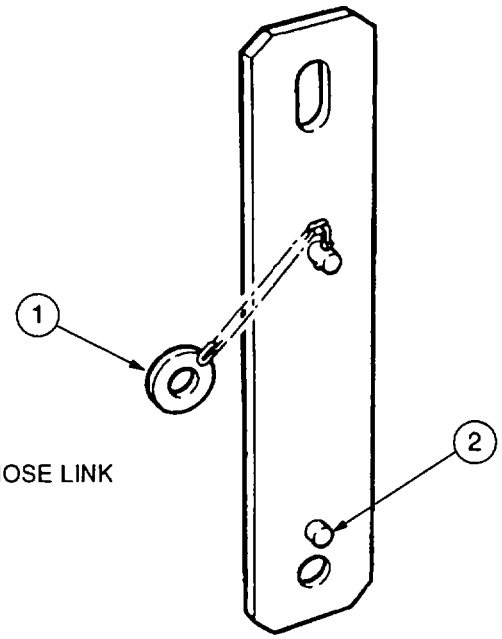
(6) MARKING. The bottom cross member is marked as shown to ensure that the davits are assembled in the correct orientation. The arrow must point towards the outside of the bridge.

(7) IDENTIFICATION PLATE. The component serial number is marked on this plate.



(10) Launching Nose Link (LNL)

The launching nose link connects the second story launching nose to the first story and to the launching nose roller. It is used on the longest double story and link reinforced bridges. Two links are used, one on each side of the launching nose.



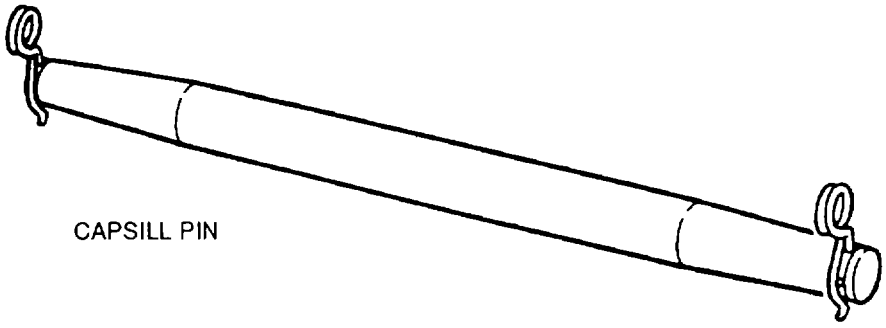
LAUNCHING NOSE LINK

(1) WASHER. Used on headless pin with retainer clip.

(2) SPACER. Provides correct spacing from nose section.

(11) Capsill Pin

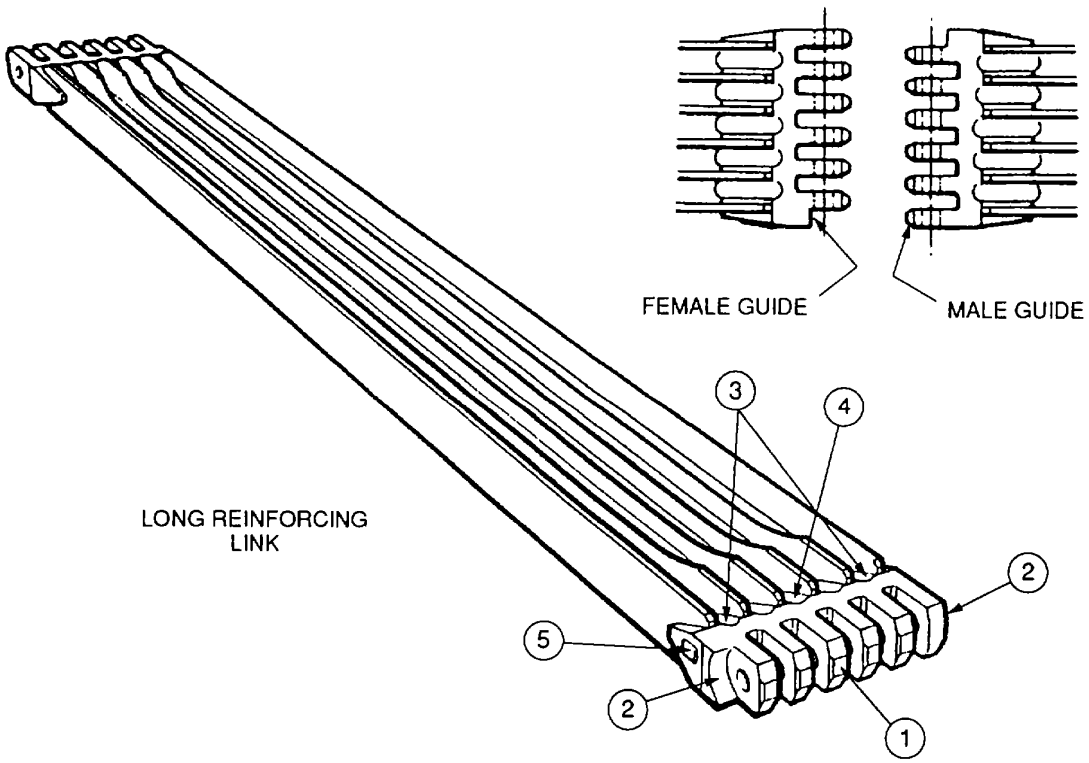
The capsill pin is used to support the jack seat in certain positions in the adjustable support. The capsill pin is required for use when constructing 2E + 13 thru 2E + 22 bay bridges with and without link reinforcement.



CAPSILL PIN

(12) Long Reinforcing Link

The long reinforcing link is used to reinforce double story bridges and connects to other reinforcement components with nose pins. The pin jaws of each link have a guide system built into them and these guides allow easy insertion of the nose pin. A long link connects the anchor junction block to the post tensioning assembly. The long link is carried by two personnel.



(1) PIN JAWS. Take tension load when connected by nose pin to another link in the link chain. Nose pin is inserted from the outside toward the inside and secured with a retainer clip.

(2) MALE AND FEMALE GUIDE. Allows easy insertion of nose pin used to connect links.

(3) OUTER SLOTS. For insertion of the toggle bar that connects the anti-flutter tackle to the link.

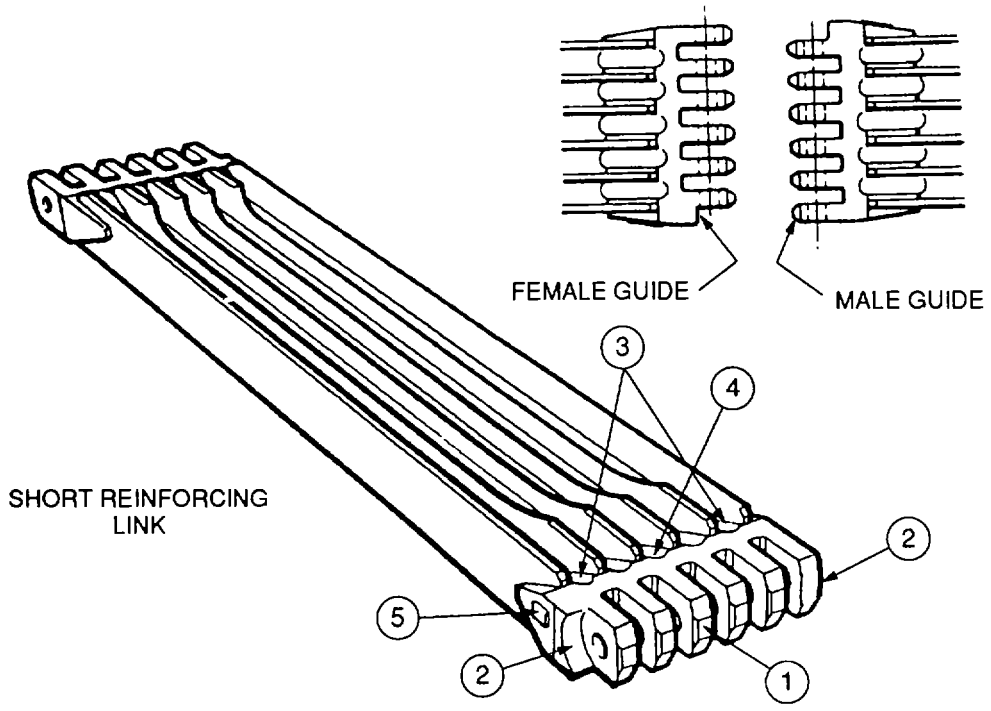
(4) CENTER SLOT. For insertion of the toggle bar that connects the light tackle to the link.

(5) IDENTIFICATION PLATE. The component serial number is marked on this plate.

(13) Short Reinforcing Link

The short reinforcing link is used in double story link reinforced bridges that contain an odd number of bays and is connected to long links with nose pins. The pin jaws of each link have a guide system built into them and these guides allow easy insertion of the nose pin. The nose pin is inserted from the outside toward the inside and secured with a retainer clip. The short link is carried by one person.

The parts of the short link listed below are similar to those of the long link and perform the same functions.



(1) PIN JAWS.

(2) MALE AND FEMALE GUIDE.

(3) OUTER SLOTS.

(4) CENTER SLOTS.

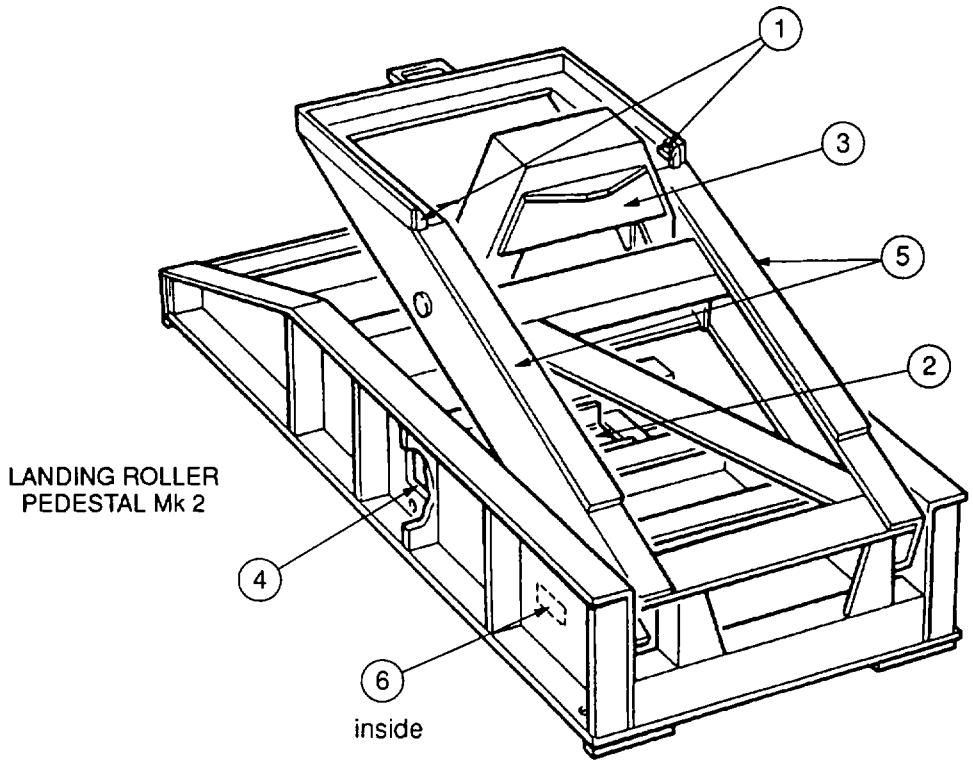
(5) IDENTIFICATION PLATE. The component serial number is marked on this plate.

(14) Landing Roller Pedestal Mk 2 (LRP)

The landing roller pedestal holds the landing roller and receives the launching nose on the far side of the gap. The Mk 2 LRP is used for all link reinforced bridges. The height of the LRP is adjusted with a hydraulic jack (20 ton).

WARNING

Use great care when the pedestal is being raised or lowered. Serious bodily injury may result if LRP is improperly operated.



(1) LUGS. Hold rear of landing roller in position.

(2) JACK SEAT. Base for 20T hydraulic jack used to adjust height of upper frame. Pivot mounted to keep jack seated solidly in frame during operation.

(3) SADDLE. Fits head of jack. Pivot mounted to keep saddle on jack head during operation.

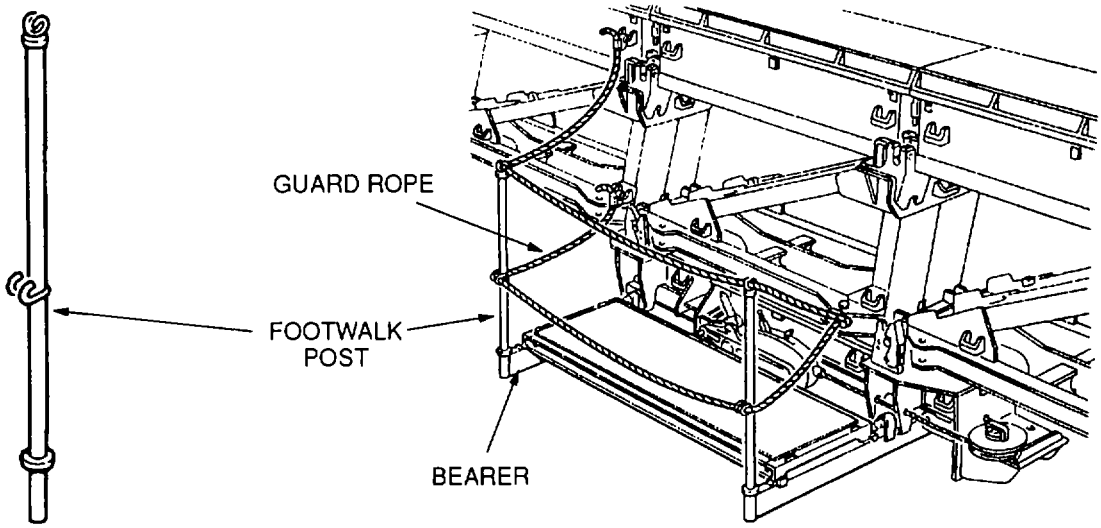
(4) ACCESS HOLES. For safe operation of hydraulic jack.

(5) REINFORCING PLATE. This is plate that is welded to standard LRP to reinforce it. It is one way of identifying a Mk 2.

(6) IDENTIFICATION PLATE. The component serial number is marked on this plate.

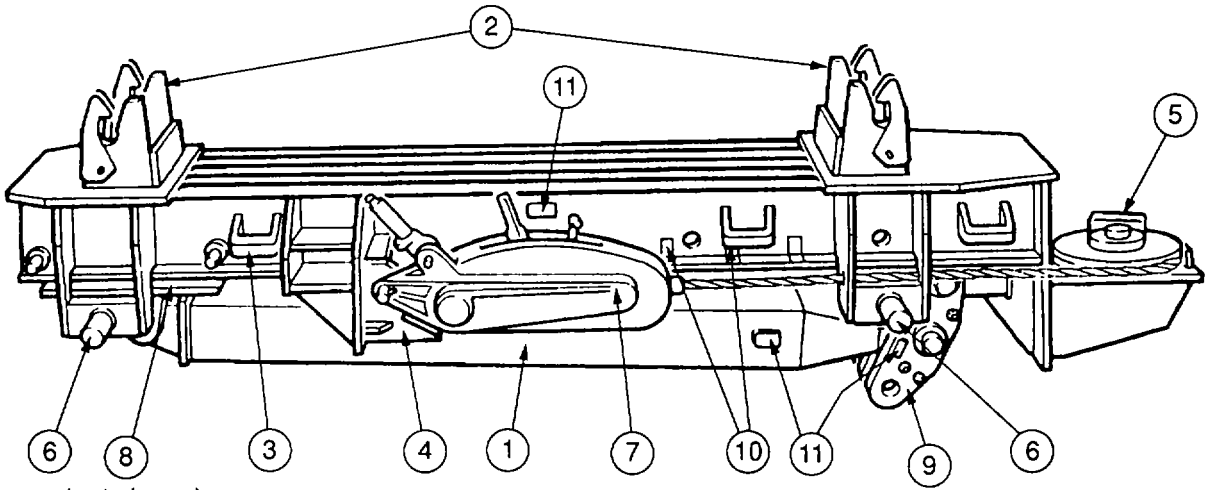
(15) Footwalk Post

The footwalk post is used to provide a guard rail on the post tensioning work platform.



(16) Post Tensioning Assembly (PT)

The post tensioning assembly is used to remove slack from the complete reinforcement system. When the tension post is correctly positioned, nearly vertical, the entire system is tensioned and the bridge is reinforced. There are four assemblies in a bridge. Before loading on a pallet, two must be assembled as right hand, and two as left hand assemblies. This is done by positioning of the cable pullers in one or the other of the alternate positions on the frame. The tensioning post assembly is equipped with six carrying bar brackets which are used for carrying, and for lifting when connecting the assembly to the bridge.



POST TENSIONING ASSEMBLY

(1) REINFORCING POST. Allows tensioning of the system as it is pulled to a near vertical positioning under the bridge.

(2) UPPER JAW CATCH ASSEMBLY. Connects the post tensioning assembly to the panel pins in the lower flange of the bottom panel. The jaws snap into position around the pins and then they are secured with retainer clips.

(3) CARRYING BAR BRACKET. For connection of carrying bars used to carry panel. Three brackets on each side. The post assembly is carried by six personnel.

(4) PULLER BRACKET. For connection of cable puller that is used to tension post.

(5) TACKLE BLOCK. For reeving of cable from puller to post. Block is placed in either one of two positions making the assembly either right or left handed.

(6) STUB PINS. For connection of the footwalk bearer to the frame assembly.

(7) CABLE PULLER [with 20 ft (6 m) cable]. Used to pull the reinforcing post to a near vertical position.

(8) BETALIGHT. Betalights are provided for attachment to post tensioning assembly. Purpose of Betalights is to illuminate check marks for construction at night.

(9) LINK CONNECTING BLOCK. Connects the post tensioning assembly to the reinforcing links.

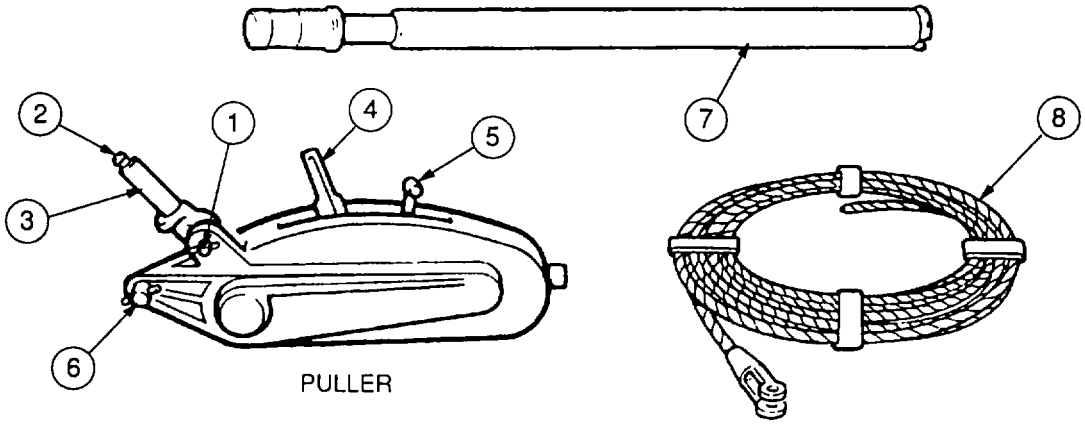
(10) TENSIONING CHECK MARKS. These are four marks painted on the tensioning frame to ensure even progress during tensioning. There is one mark on the sliding block which will align with each of the four marks on the frame during the tensioning operation.

(11) IDENTIFICATION PLATE. The component serial number is marked on this plate.

(17) Puller

The puller is used with the jacking bracket and davits to raise or lower the bridge. It is the same type of puller as the one used on the post tensioning assembly.

CAUTION
Always operate In low gear.



PULLER

(1) GEAR CHANGE CONTROL. For selecting high or low gear by rotating control to required position. Control cannot be rotated until gear change plunger is raised.

(2) GEAR CHANGE BUTTON. Raising the plunger allows gear change control to be rotated.

(3) LEVER OPERATING HANDLE. Operated by handle for taking in cable.

(4) LEVER CONTROL HANDLE. Operated by handle for paying out cable.

(5) HAND CONTROL LEVER. Releases the jaw blocks which grip the cable.

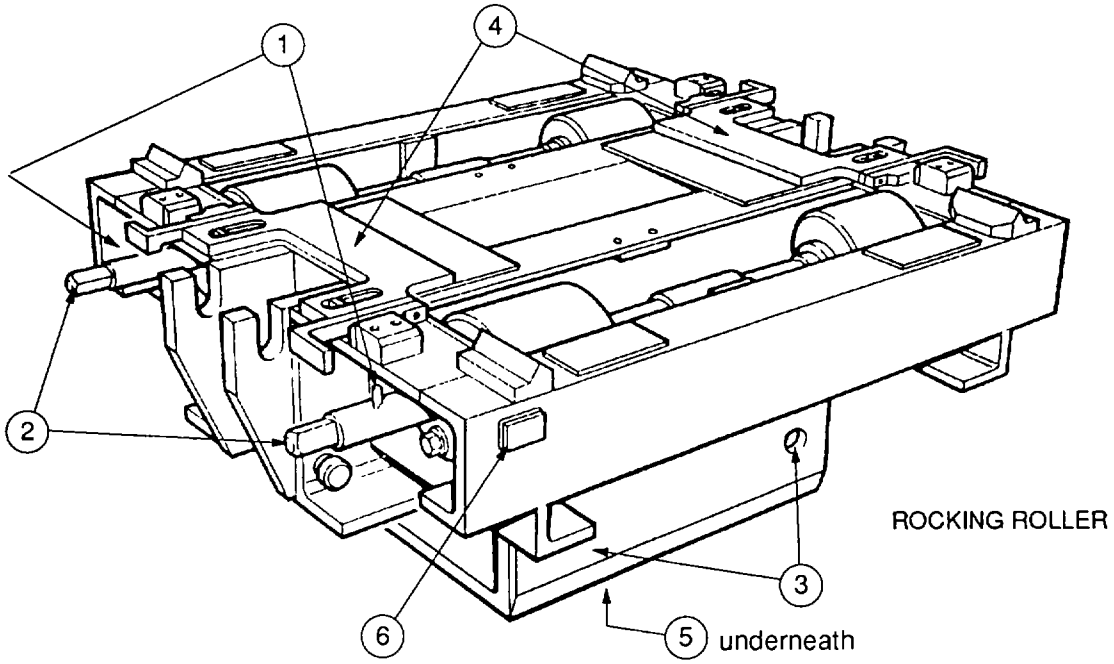
(6) ANCHOR PIN. For connection of puller to jacking bracket, or post tensioning assembly.

(7) HANDLE. For operating item 3 and 4 above. On item 3 handle is pushed on then twisted to lock it in position.

(8) CABLE.

(18) Rocking Roller

The rocking roller is used on the bridging capsill to form the capsill roller beam which is required for 2E + 13 thru 2E + 22 bay DS MGBs with and without reinforcement.



(1) UP/DOWN INDICATOR. Indicates whether roller is up or down.

(2) ROLLER SHAFT. This shaft is square ended to allow fitting of the ratchet wrench used to turn the shaft to raise or lower the rollers.

(3) NOSE PIN HOLES. For the nose pins which secure the rollers to the capsill. These nose pins are always secured with retainer clips.

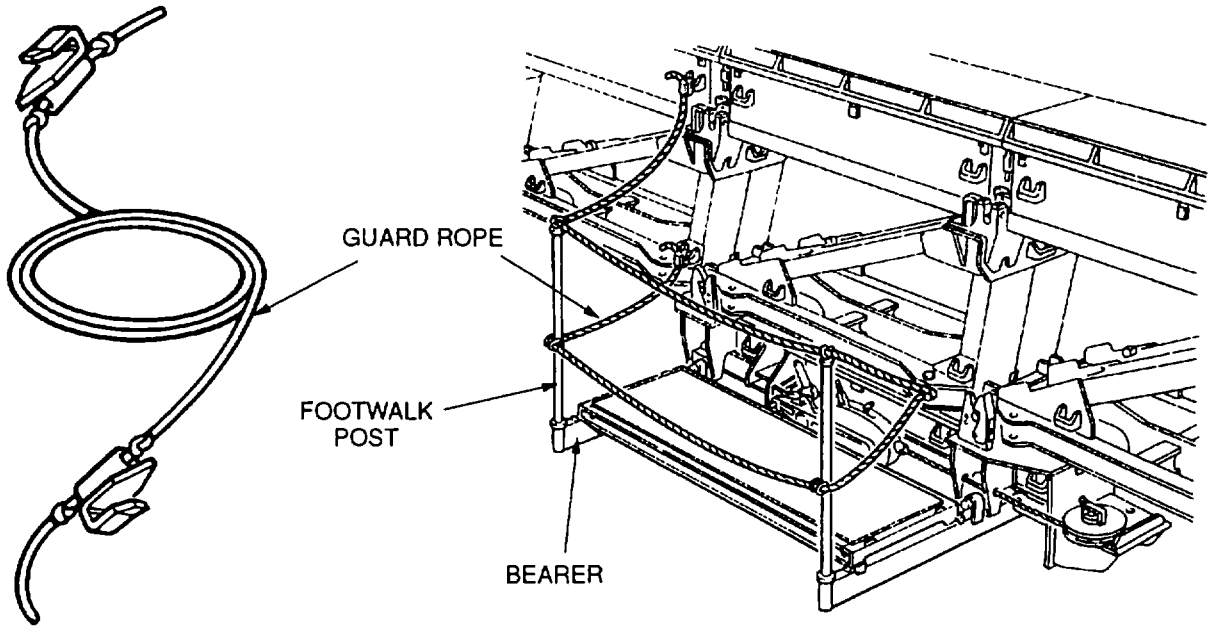
(4) BEARING PADS. Moveable plates on the roller frame that the bridge will sit on when the rollers are turned to the down position; this is called the locked position of the rollers. To unlock, the rollers are raised, and the plates slid outward.

(5) GUIDE HOLES. Used to properly align rocking roller on capsill.

(6) IDENTIFICATION PLATE. The component serial number is marked on this plate.

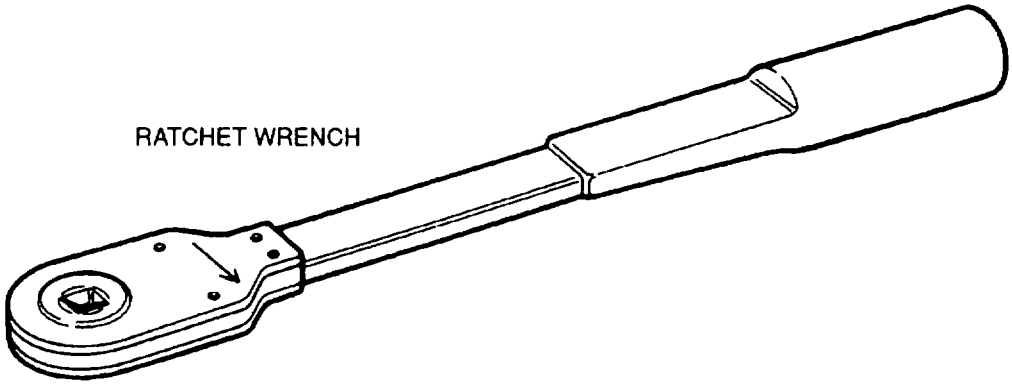
(19) Guard Rope

The guard rope is used on the footwalk posts to provide a guard rail, for the safety of the tensioning post work party.



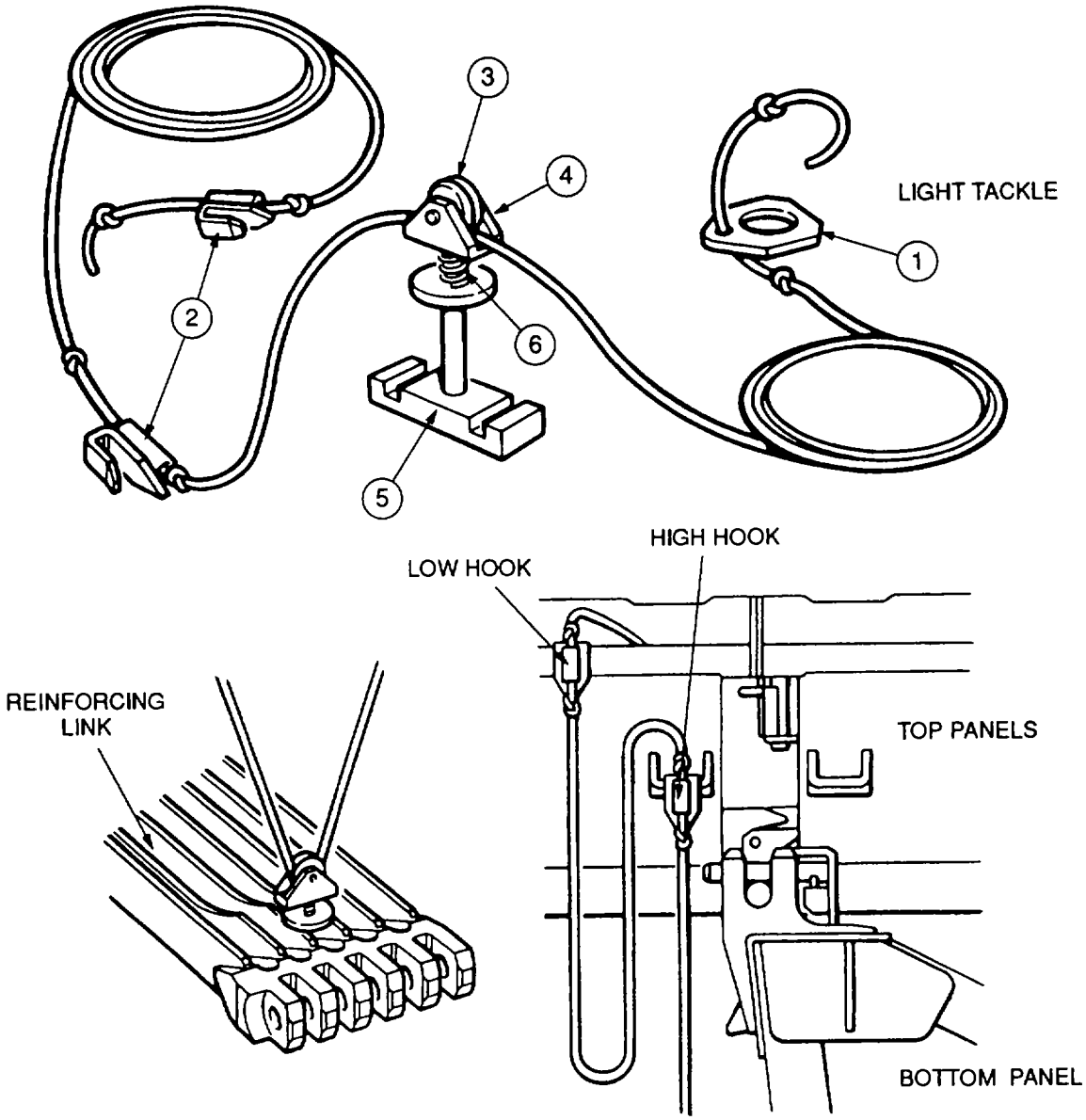
(20) Ratchet Wrench 3/4 in

The ratchet wrench is used to turn the roller shafts of the rocking roller to raise or lower the rollers.



(21) Light Tackle (LT)

Light tackle is used to support the reinforcing links as a slack link chain under the bridge, during building and booming. It lowers the link chain to its final position 7 ft (2.1 m) under each girder.



(1) PLATE. Fits on protruding end of panel pin in bottom panel, on inside of bridge. Secured to end of pin with a retainer clip.

(2) HOOKS. Fit on a carrying bar bracket of top panel, on outside of bridge. The hook closest to the end of the tackle is the LOW position hook. The LOW position hook is connected to the top panel carrying bar bracket after the bridge is jacked down. The other hook is the HIGH position hook. It is connected to the top panel bracket during building and booming.

(3) PULLEY. Allows the rope to ride through the block during changing of the hooks to a different position.

(4) BLOCK. The pulley and toggle bar are fitted to the block.

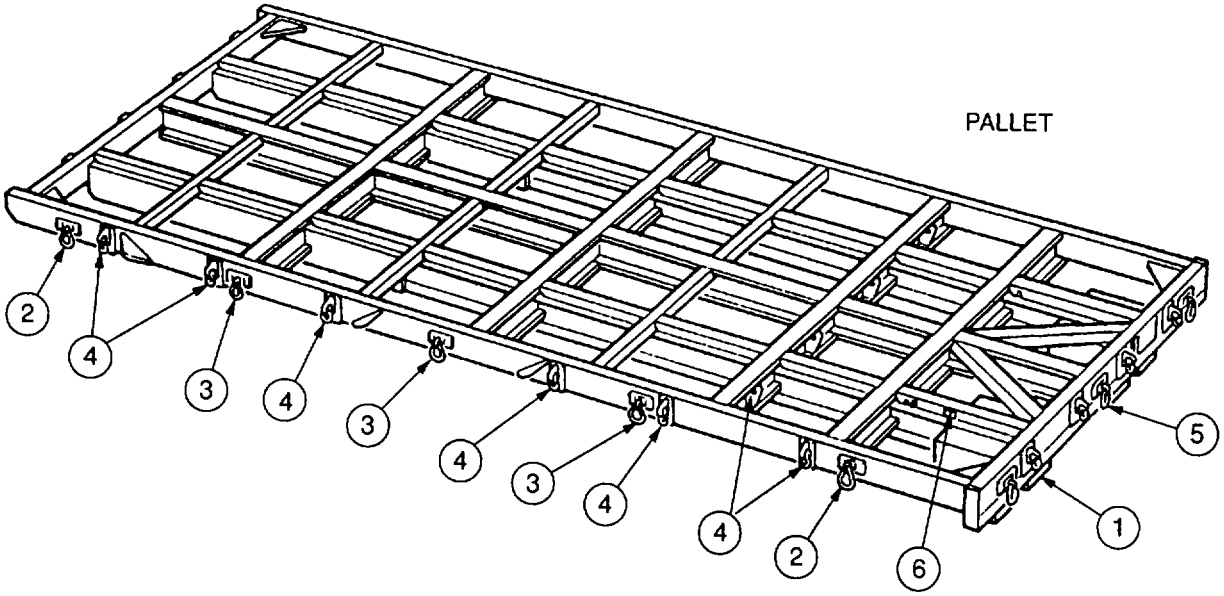
(5) TOGGLE BAR. Connects the tackle to the link.

(6) SPRING. Keeps the toggle bar in the locked position.

d. Support Equipment. The support equipment needed to transport, and load/unload the bridge and erection components is illustrated and explained in this section. The truck and trailer illustrated in paragraphs (2) and (3) are typical and are not part of the bridge, erection and link sets.

(1) Pallet

The pallet is used to hold the bridge and erection parts for crane loading of trucks and trailers. It permits fast off-loading of trucks and trailers, by dumping or pulling loads off.



(1) RUBBER BUFFER. Absorbs initial shock when rear of pallet hits the ground.

(2) PALLET LIFTING RINGS. Used with lifting slings on crane to lift loaded pallets onto trucks and trailers.

(3) PALLET TIE-DOWN RINGS. Used to secure pallet on truck or trailer.

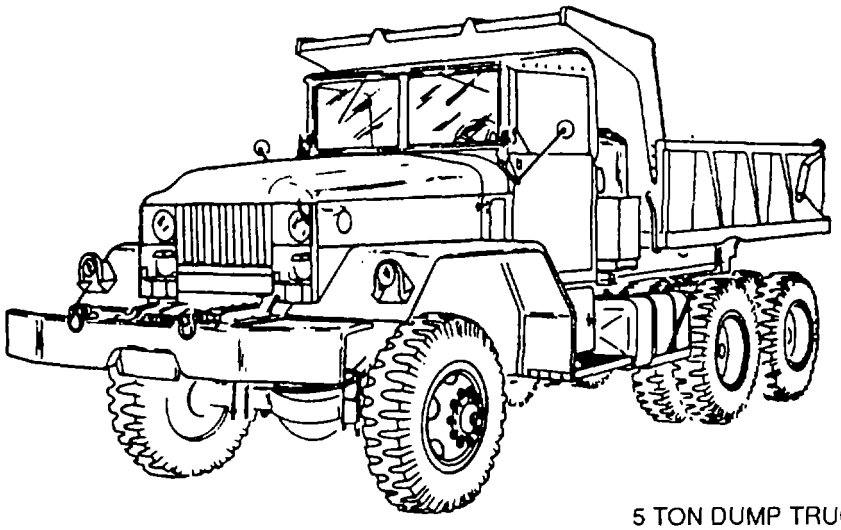
(4) SHACKLES. Used to hold parts on pallets.

(5) EXTRACTOR (Same as item 3). For connection of extractor cable to remove pallets from trailer, or truck if needed.

(6) IDENTIFICATION PLATE. The component serial number is marked on this plate.

(2) Truck, 5 Ton Dump (Tactical Models)

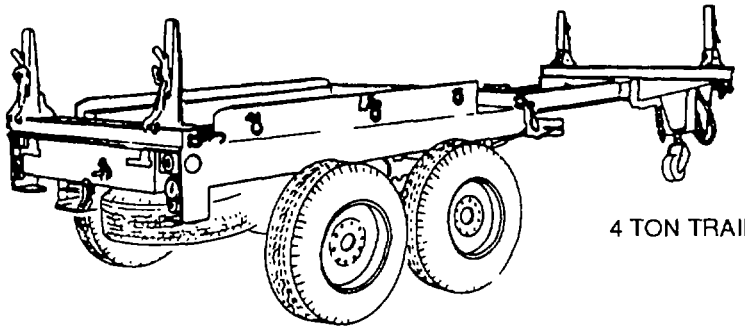
The dump truck is the primary means of transporting one pallet load of bridge components, and for pulling one trailer loaded with components. It is used as the launching vehicle for bridge booming/launching, and retrieval of bridge.



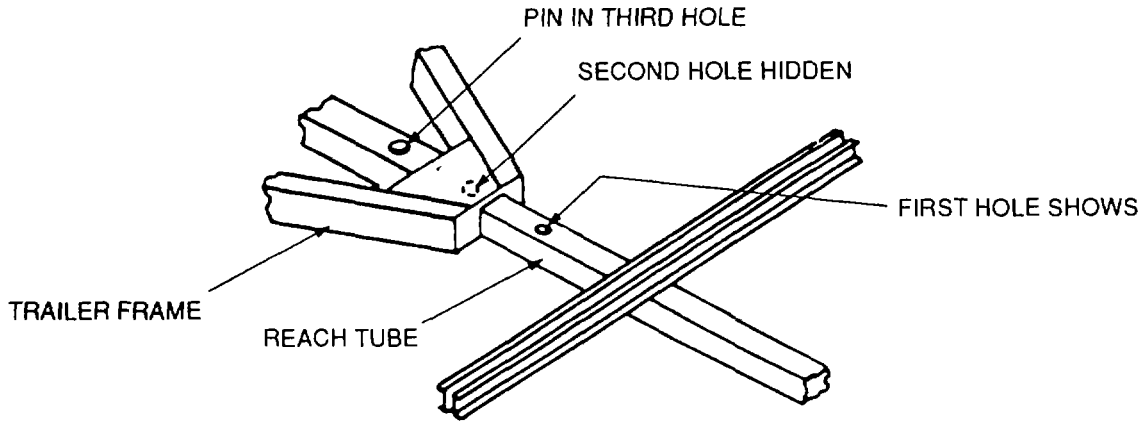
5 TON DUMP TRUCK

(3) Trailer, 4 Ton (Bolster Trailer)

The trailer is used to carry one pallet of bridge parts, when fitted with the pallet adapter.

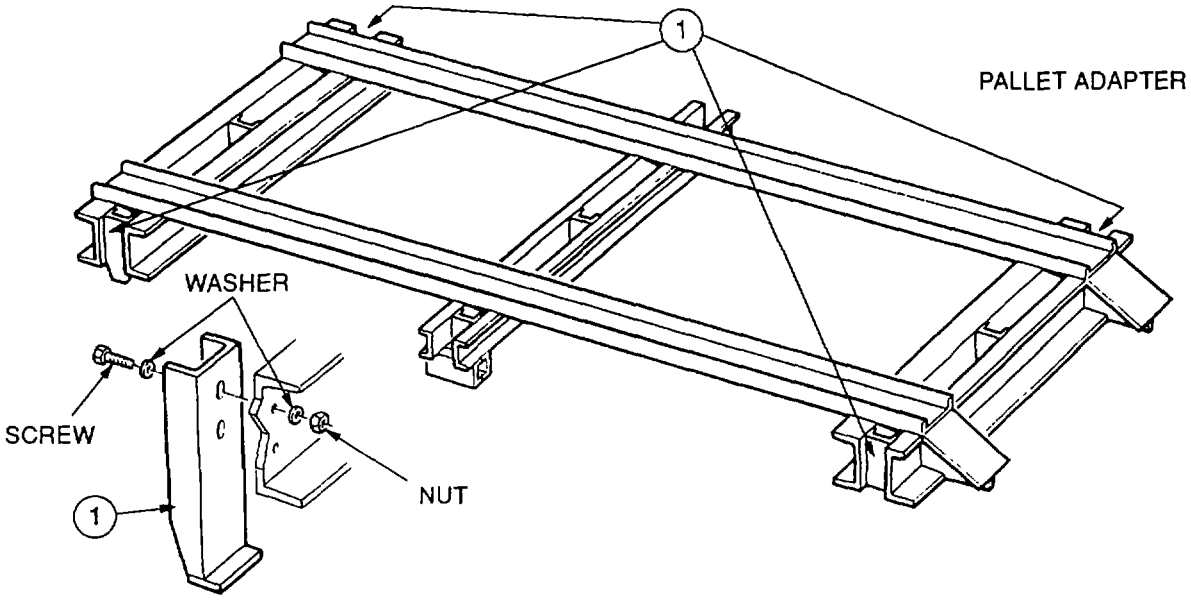


4 TON TRAILER



(4) Pallet Adapter

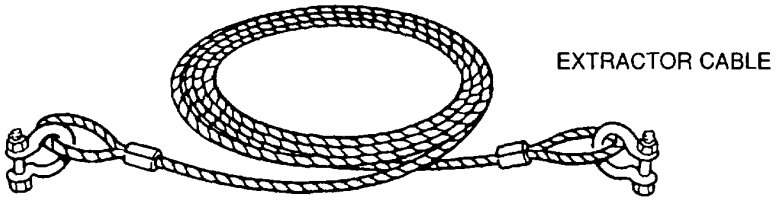
The pallet adapter is needed to fit and secure the pallet to the trailer. Permits trailer to be pulled out from under pallet for off-loading.

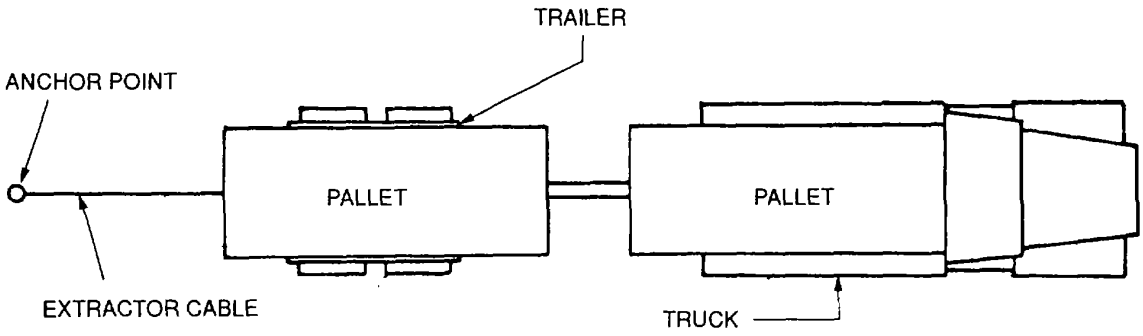


(1) ADAPTER BRACKETS. Secure to trailer with screws, washers and nuts.

(5) Extractor Cable

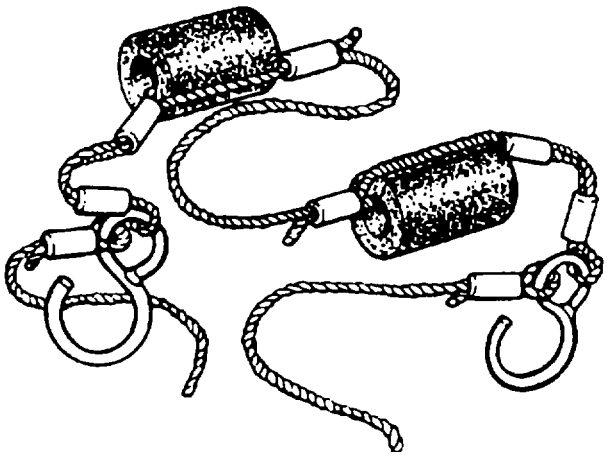
The extractor cable connects the pallet on the trailer to an anchor point, so that the trailer can be driven out from under the pallet. The cable is used with two shackles.





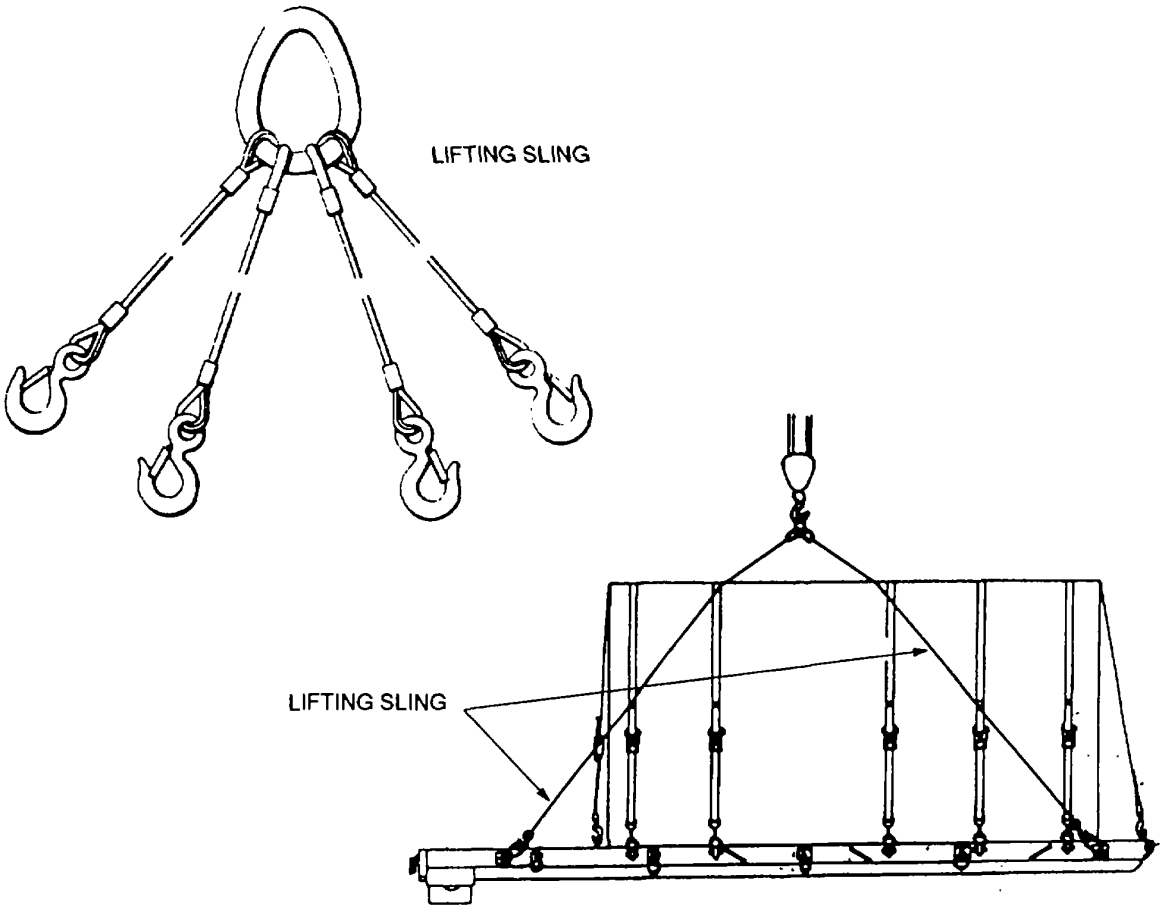
(6) Pallet Rear Buffer Assembly

The rear buffer assembly absorbs shock of pallet falling to ground during off-loading.



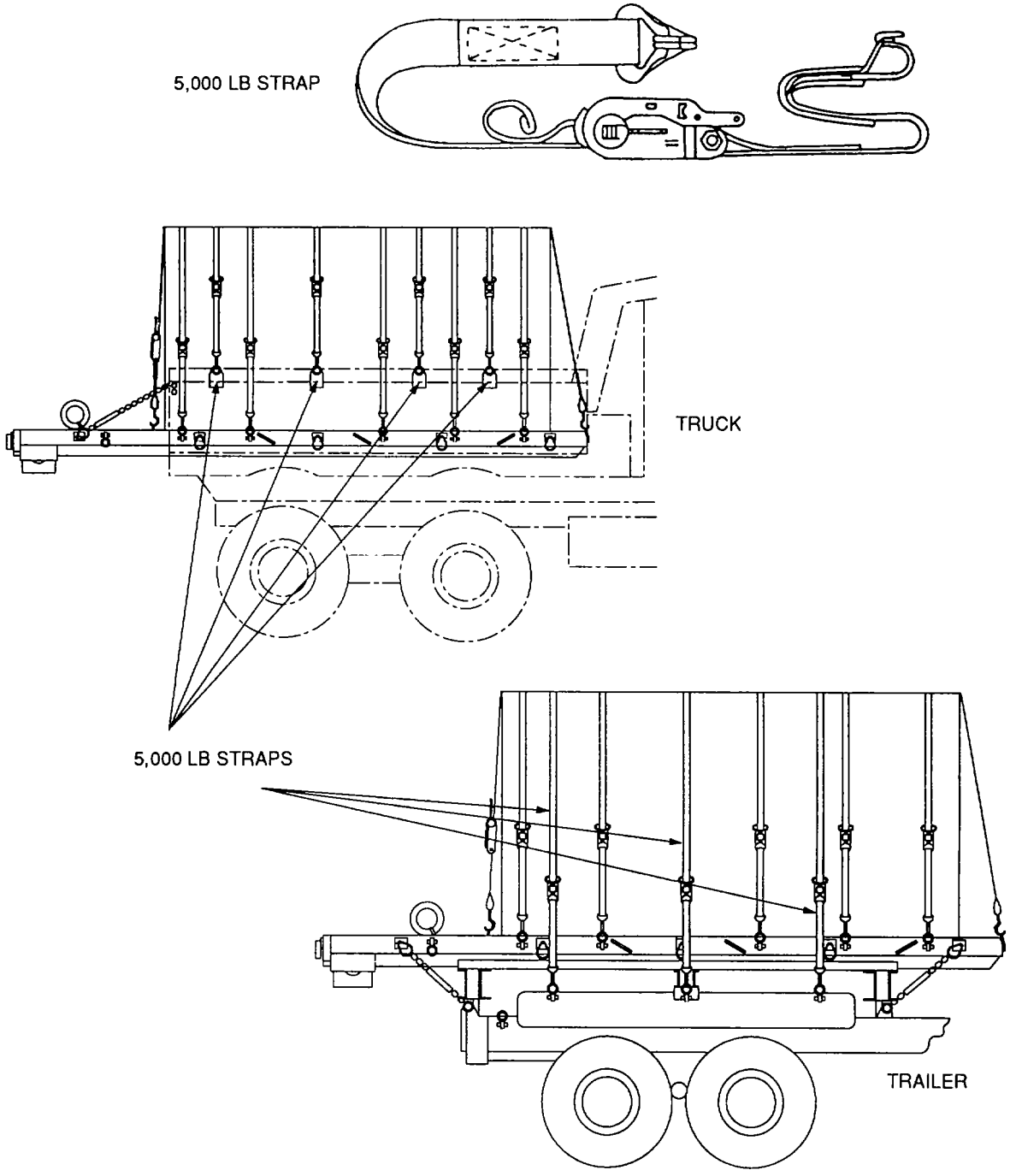
(7) Lifting Sling

The lifting sling is used to lift pallets onto trucks and trailers.



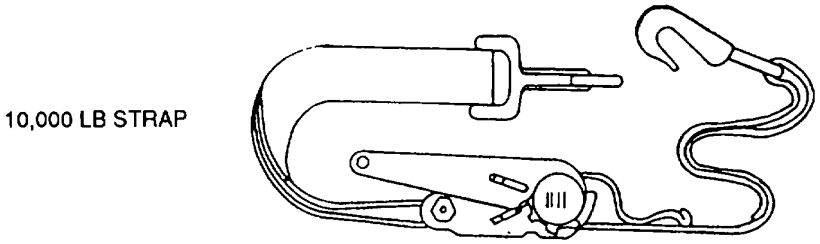
(8) Strap, 5,000 lb.

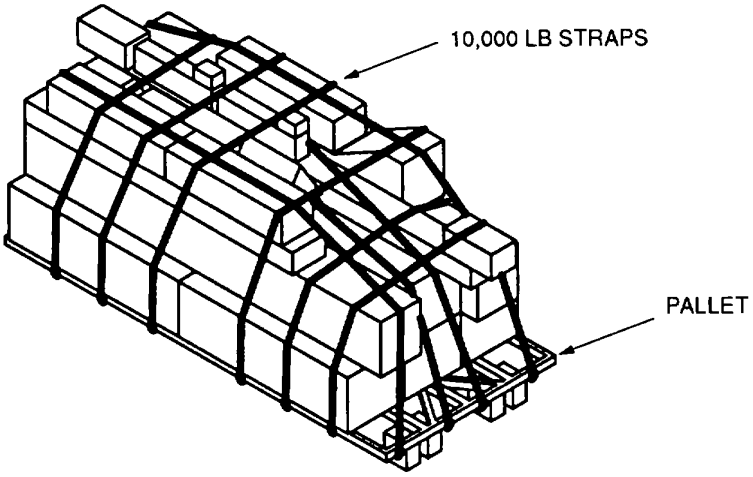
The strap is used to secure loaded pallets on the dump truck and the trailer. It can also be used to secure the landing roller pedestal on the tip of the launching nose during launch of bridge.



(9) Strap, 10,000 lb.

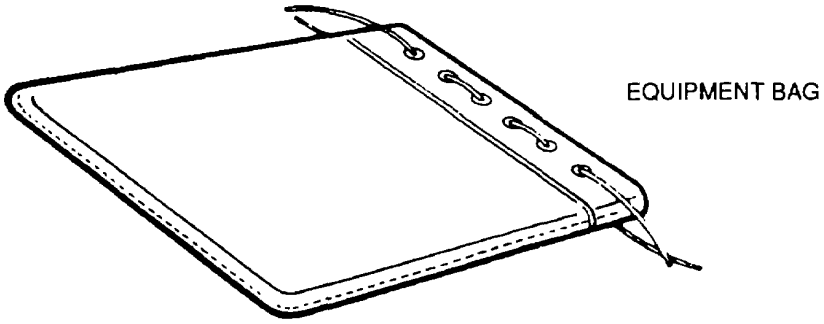
The strap is used to secure the components on the pallet. It can also be used to secure the landing roller pedestal on the tip of the launching nose during launch of bridge. It is also used around the bays of the bridge during disassembly of double story on the far bank.





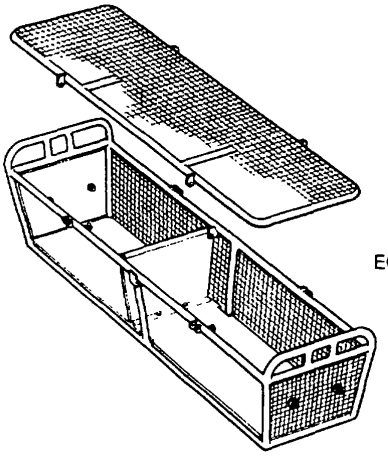
(10) Equipment Bag

The equipment bag is used to hold retainer clips.



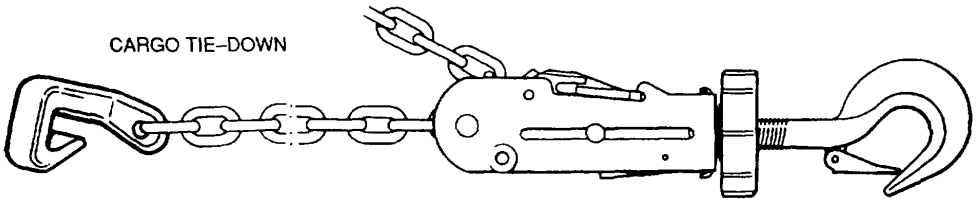
(11) Equipment Basket

The equipment basket is used to hold smaller bridge and erection parts, such as panel pins, nose pins, bracing pins and jacks.



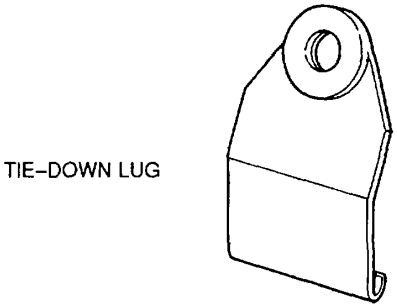
(12) Tie-Down, Cargo, Aircraft, MB-1

The tie-down is used to secure pallets on truck and trailer.



(13) Tie-Down Lug

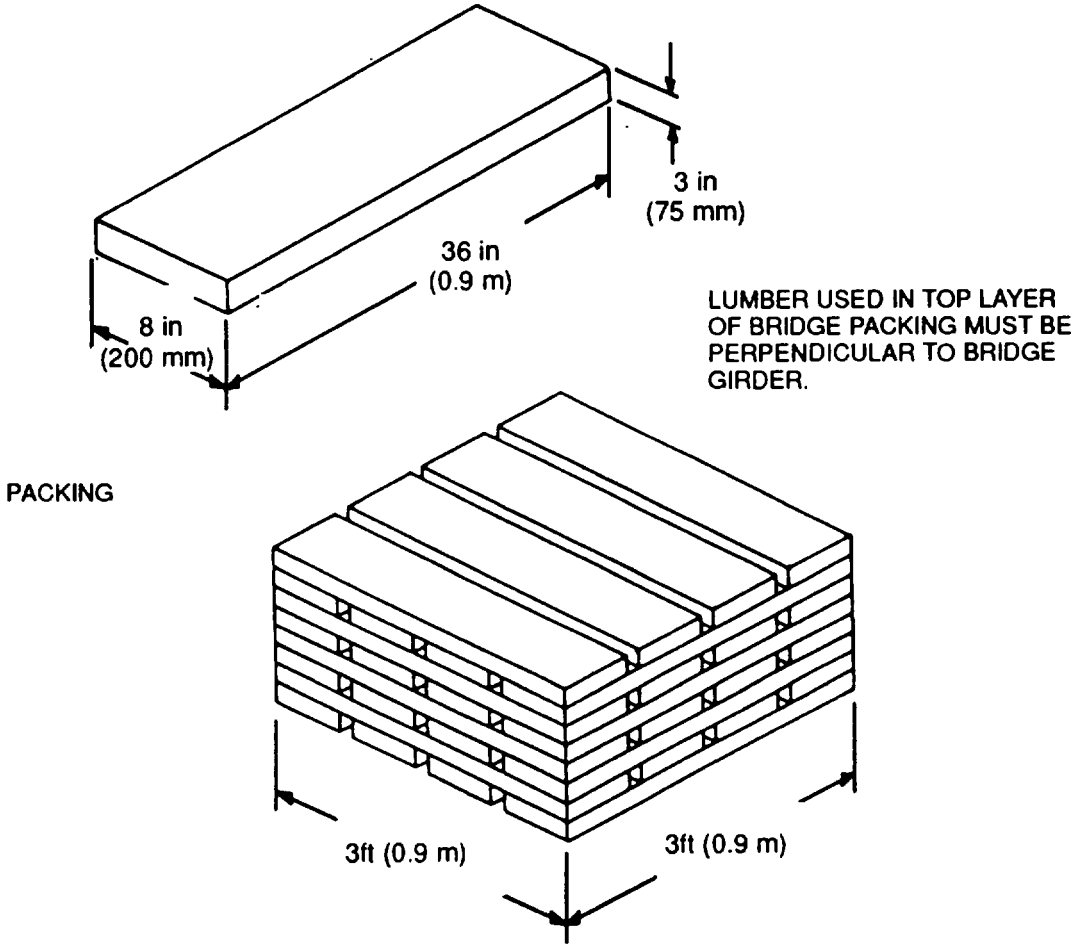
The tie-down lug is used with 5,000 lb straps to secure loaded pallets on trucks.



(14) Packing

Packing is used under baseplates, landing roller and pedestal, and the end of bridge to provide solid bearing, and to raise these items off the ground when needed. It is used in pallet loads to take up space between components so that loads can be tightly secured. Packing sizes are as follows:

3 in x 8 in x 36 in (75 x 200 x 900 mm)
3 in x 8 in x 84 in (75 x 200 x 2133 mm) [4 pieces] [for use with Link Reinforcement Set]



(1-10 EQUIPMENT DATA)

Adjustable Support

Length	5 ft 5 in (1.65 m)
Width	7 in (0.18 m)
Height	3 ft 8 in (1.12 m)
Weight	143 lb (65 kg)
	Carried by 2 personnel
No. in set	6 (erection)
	2 (link)

Anchor Assembly (AA)

Length	10 It 9-1/2 in (3.29 m)
Width	2 ft 3-5/8 in (0.70 m)
Height	11-3/16 in (0.28 m)
Weight	362 lb (164 kg)
	Carried by 4 personnel
No. in set	5 (link)

Anchorage Pin Assembly

Length	2 ft 9-7/8 in (0.86 m)
Diameter	1-3/4 in (0.04 m)
Weight	26 lb (11.8 kg)
	Carried by 1 person
No. in set	10 (link)

Anti-Flutter Tackle (AF)

Length	9 ft 10 in (3.00 m)
Weight	4.4 lb (2 kg)
Carried by 1 person	
No. in set	5 (link)

Bankseat Beam (BSB)

Length	13 ft 3-1/2 in (4.06 m) overall
Width	1 ft 6 in (0.46 m) overall
Height	1 ft 9-3/8 in (0.54 m) overall
Weight	570 lb (258 kg)
	Carried by 6 personnel
No. in set	7 (bridge)

Baseplate (Single Story)

Length	2 ft 3/8 in (0.62 m)
Width	1 ft 5-1/4 in (0.44 m)
Height	7-3/4 in (0.20 m)
Weight	32 lb (14.5 kg)
	Carried by 1 person
No. in set	2 (erection)

Baseplate (Double Story)

Length	5 ft 4 in (1.63 m)
Width	1 ft 11 in (0.58 m)
Height	6-3/4 in (0.17 m)
Weight	93 lb (42 kg)
	Carried by 2 personnel
No. in set	6 (erection)
	4 (link)

Bottom Panel (BP)

Length	6 ft 5 in (1.96 m) overall
	6 ft (1.83 m) effective
Width	2 ft 3 in (0.69 m) overall
Height	3 ft 7-3/8 in (1.1 m)
Weight	435 lb (197 kg)
	Carried by 4 personnel
No. in set	26 (bridge)

Bracing Pin

Length	7-1/4 in (0.18 m)
Diameter	1 in (2.54 cm)
Weight	1-1/2 lb (0.68 kg)
	Carried by 1 person
No. in set	68 (bridge)
	8 (erection)
	22 (link)

Bracket Adapter: (Trailer) Pallet:

Length	9-1/2 in (0.24 m)
Width	5 in (0.13 m)
Weight	12 lb (5.45 kg)
	Carried by 1 person
No. in set	20 (bridge)
	4 (erection)
	4 (link)

Bridge Marker Guide

Length	4 ft 5 in (1.35 m) min.
	5 ft 11 in (1.80 m) max.
Weight	5-1/4 lb (2.4 kg)
	Carried by 1 person
No. in set	24 (bridge)

Building Pedestal (BP)

Length	2 ft 1/2 in (0.62 m)
Width	1 ft 7 in (0.48 m)
Height	1 ft 4 in (0.41 m)
Weight	16 lb (7.25 kg)
	Carried by 1 person
No. in set	7 (erection)

Capsill

Length	15 ft 5-7/16 in (4.71 m)
Width	2 ft 6 in (0.76 m)
Height	1 ft 2-5/8 in (0.37 m)
Weight	400 lb (181 kg)
	Carried by 6 to 8 personnel
No. in set	2 (link)

Capsill Pin

Length	1 ft 8-1/2 in (0.52 m)
Diameter	1-1/2 in (0.04 m)
Weight	10 lb (4.5 kg)
	Carried by 1 person
No. in set	3 (link)

Carrying Bar

Length	2 ft 4-1/2 in (0.72 m)
Diameter	1-3/4 in (0.04 m)
Weight	4 lb (1.8 kg)
	Carried by 1 person
No. in set	46 (erection)

Carrying Handle

Length	1 ft 3/8 in (0.31 m)
Width	5-1/2 in (0.14 m)
Weight	1.25 lb (0.56 kg)
	Carried by 1 person
No. in set	46 (erection)

Curb

Length	5 ft 11 in (1.8 m)
Width	5-3/8 in (0.14 m)
Height	1 ft 1-1/2 in (0.34 m)
Weight	70 lb (32 kg)
	Carried by 1 person
No. in set	42 (bridge)

Davit Post Assembly

Length	9 ft 5-7/8 in (2.89 m)
Width	5 ft 5-3/16 in (1.66 m)
Height	11-7/8 in (0.30 m)
Weight	192 lb (87 kg)
	Carried by 4 personnel
No. in set	2 (link)

Deck

Length	9 ft 1 in (2.77 m) overall
Width	1 ft 5-1/4 in (0.44 m) overall
Height	6-7/8 in (0.17 m)
Weight	163 lb (74 kg)
	Carried by 2 personnel
No. in set	74 (bridge)

End Taper Panel (ETP)

Length	13 ft 2-5/8 in (4.03 m) overall
Width	2 ft 4 in (0.71 m)
Height	1 ft 5-3/4 in (0.45 m)
Weight	600 lb (272 kg)
	Carried by 6 personnel
No. in set	5 (bridge)

Equipment Bag

Length	1 ft 2 in (0.36 m)
Width	10 in (0.25 m)
Weight	5/8 lb (0.28 kg)
	Carried by 1 person
No. in set	8 (bridge)
	2 (erection)
	2 (link)

Equipment Basket

Length	4 ft 9 in (1.45 m)
Width	1 ft 3 in (0.38 m)
Height	1 ft (0.30 m)
Weight	62 lb (28 kg) (empty)
	Carried by 2 personnel
No. in set	14 (bridge)
	6 (erection)
	4 (link)

Extractor Cable

Length	20 ft (6.10 m)
Weight	22 lb (10 kg)
	Carried by 1 person
No. in set	1 (erection)

Fixed Support

Length	1 ft 4-1/2 in (0.42 m)
Width	1 ft (0.3 m)
Height	9-1/2 in (0.24 m)
Weight	14 lb (6.35 kg)
	Carried by 1 person
No. in set	7 (erection)

Footwalk

Length	5 ft 11-7/8 in (1.83 m)
Width	2 ft 2-7/8 in (0.68 m)
Depth	2-11/16 in (0.07 m)
Weight	54 lb (24.5 kg)
	Carried by 1 person
No. in set	5 (link)

Footwalk Bearer

Length	5 ft 3/8 in (1.53 m)
Width	2-3/4 in (0.07 m)
Depth	7-3/4 in (0.20 m)
Weight	17 lb (7.7 kg)
	Carried by 1 person
No. in set	10 (link)

Footwalk Post

Length	4 ft 3/8 in (1.23 m)
Width	3-13/16 in (0.94 m)
Depth	2-15/16 in (0.75 m)
Weight	2.6 lb (1.2 kg)
	Carried by 1 person
No. in set	10 (link)

Frame Cross Girder

Length	14 ft 3-1/4 in (4.35 m)
Width	1 ft 8 in (0.51 m)
Height	1 ft 3 in (0.38 m)
Weight	171 lb (77.5 kg)
	Carried by 2 personnel
No. in set	3 (erection)

Guard Rope

Length	30 ft (9.14 m)
Weight	2 lb (0.9 kg)
	Carried by 1 person
No. in set	4 (link)

Hammer

Weight	1.5 lb (0.7 kg)
	Carried by 1 person
No. in set	6 (link)

Headless Panel Pin

Length	2 ft 5 in (0.74 m)
Diameter	1-3/4 in (4.44 cm)
Weight	19 lb (8.62 kg)
	Carried by 1 person
No. in set	5 (bridge)
	1 (link)
	2 (erection)

Hydraulic Jack 15

Height	1 ft 7 in (0.48 m) minimum 2 ft 8 in (0.81 m) extended
Weight	47 lb (21 kg) Carried by 1 person
No. in set	7 (erection)

Hydraulic Jack 20T

Height	1 ft 6-1/2 in (0.47 m) minimum 2 ft 6-1/2 in (0.78 m) maximum
Weight	47lb (21 kg) Carried by 1 person
No. in set	3 (link)

Jack Post

Length	2 ft 10-3/4 in (0.88 m)
Width	6 in (0.15 m)
Height	11 in (0.28 m)
Weight	43 lb (19.5 kg) Carried by 1 person
No. in set	4 (erection)

Jack Seat

Length	9-1/4 in (0.23 m)
Width	1 ft (0.3 m)
Height	5 in (0.13 m)
Weight	6 lb (2.7 kg) Carried by I person
No. in set	5 (erection) 2 (link)

Jack Support

Length	1 ft 3 in (0.38 m)
Width	9 in (0.23 m)
Height	10-1/2 in (0.26 m)
Weight	12 lb (5.5 kg) Carried by 1 person
No. in set	5 (erection)

Jacking Bracket

Length	4 ft 8-1/2 in (1.44 m)
Width	1 ft 2-7/16 in (0.36 m)
Height	1 ft 6 in (0.46 m)
Weight	135 lb (61.2 kg) Carried by 2 personnel
No. in set	3 (link)

Junction Panel (JP)

Length	3 ft 5-1/4 in (1.05 m) overall
	3 ft (0.91 m) effective
Width	2 ft 1-1/2 in (0.66 m)
Height	5 ft 3/4 in (1.54 m)
Weight	478 lb (217 kg)
	Carried by 4 personnel
No. in set	5 (bridge)

Landing Roller (LR)

Length	1 ft 4 in (0.4 m)
Width	1 ft 10-1/2 in (0.57 m)
Height	11 in (0.28 m)
Weight	61 lb (27.7 kg)
	Carried by 1 person
No. in set	4 (erection)
	2 (link)

Landing Roller Pedestal Mk 1 (LRP)

Length	5 ft 7 in (1.7 m)
Width	2 ft 6-5/8 in (0.8 m)
Height	1 ft 2-1/2 in (0.37 m)
Weight	215 lb (97.5 kg)
	Carried by 4 personnel
No. in set	2 (erection)

Landing Roller Pedestal Mk 2 (LRP)

Length	5 ft 7 in (1.7 m)
Width	2 ft 6-5/8 in (0.78 m)
Height	1 ft 2-1/2 in (0.37 m)
Weight	218 lb (99 kg)
	Carried by 4 personnel
No. in set	3 (link)

Launching Nose Cross Girder (LNCO)

Length	8 ft 7-1/2 in (2.63 m)
Width	10-1/4 in (0.26 m)
Height	1 ft 6 in (0.46 m)
Weight	157 lb (71 kg)
	Carried by 2 personnel
No. in set	1 (erection)

Launching Nose Cross Girder Post

Length	5 ft 10 in (1.8 m)
Width	4 in (0.1 m)
Height	7-1/4 in (0.18 m)
Weight	32 lb (14.5 kg) Carried by 1 person
No. in set	4 (erection)

Launching Nose Heavy (LNH)

Length	10.ft 4-3/4 in (3.17 m) overall 10 ft (3.05 m) effective
Width	1 ft 6 in (0.46 m)
Height	2 ft 1 in (0.63 m)
Weight	386 lb (175 kg) Carried by 4 personnel
No. in set	8 (erection) 6 (link)

Launching Nose Link (LNL)

Length	2 ft 7 in (0.79 m)
Width	6 in (0.15 m)
Weight	11 lb (5 kg) Carried by 1 person
No. in set	3 (link)

Launching Nose Pin

Length	1 ft 5-1/8 in (0.44 m)
Diameter	1-1/4 in (0.03 m)
Weight	6 lb (2.72 kg) Carried by 1 person
No. in set	23 (erection) 40 (link)

Launching Nose Roller (LNR)

Height	2 ft 9-3/4 in (0.86 m)
Width	2 ft 1 in (0.64 m)
Depth	7 in (0.18 m)
Weight	62 lb (28 kg) Carried by 1 person
No. in set	2 (erection)

Lifting Sling

Length	16 ft (4.88 m)
Weight	150 lb (68 kg) Carried by 2 personnel
No. in set	1 (erection)

Light Launching Nose Front (LLNF)

Length	10 ft (3.05 m)
Width	1 ft 1-1/4 in (0.34 m)
Height 81/4 in (0.21 m)	
Weight	97 lb (44 kg) Carried by 2 personnel
No. in set	5 (erection)

Light Launching Nose Rear (LLNR)

Length	10 ft 5 in (3.17 m) overall 10 ft (3.05 m) effective
Width	1 ft 1-1/4 in (0.34 m)
Height	2 ft (0.61 m)
Weight	148 lb (67 kg) Carried by 2 personnel
No. in set	5 (erection)

Light Tackle (LT)

Length	25 ft (7.62 m)
Weight	2 lb (0.9 kg) Carried by 1 person
No. in set	20 (link)

Long Ramp

Length	14 ft 1/2 in (4.28 m) overall 14 ft (4.27 m) effective
Width	1 ft 10 in (0.56 m) overall
Height	1 ft (0.3 m)
Weight	400 lb (181 kg) Carried by 4 personnel
No. in set	15 (bridge)

Long Reinforcing Link

Length	12 ft 3-1/2 in (3.75 m)
Width	1 ft 2-1/16 in (0.36 m)
Depth	3-15/16 in (0.10 m)
Weight	125 lb (57 kg) Carried by 2 personnel
No. in set	20 (link)

Longitudinal Girder

Length	14 ft 4-1/2 in (4.38 m)
Width	1 ft 7-3/4 in (0.50 m) overall
Height	5-1/4 in (0.13 m)
Weight	109 lb (49 kg) Carried by 2 personnel
No. in set	3 (erection)

Packing Timber

(For use under bridge as packing to increase bearing)	
Dimensions	3 in x 8 in x 36 in (0.08 m x 0.2 m x 0.9 m)
Weight	20 lb (9.1 kg)
No. in set	144 (erection)
(For use in packing skid when constructing bridges with LRS)	
Dimensions	3 in x 8 in x 84 in (0.08 m x 0.2 m x 2.13 m)
Weight	50 lb (22.7 kg)
No. in set	4 (link)

Pallet

Length	14 ft 3 in (4.34 m) overall 14 ft (4.27 m) effective
Width	6 ft 9-1/4 in (2.06 m) overall 6 ft 4 in (1.93 m) effective
Height	1 ft (0.30 m)
Weight	710 lb (322 kg) Carried by 8 personnel (minimum)
No. in set	11 (bridge) 3 (erection) 2 (link)

Pallet Adapter

Length	9 ft 1 in (2.77 m)
Width	4 ft 10 in (1.47 m)
Height	10 in (0.25 m)
Weight	400 lb (181 kg) Carried by 4 personnel
No. in set	5 (bridge) 1 (link) 1 (erection)

Panel Erection Aid

Length	7 ft (2.1 m)
Width	1 ft 11-3/4 in (0.60 m)
Height	1 ft (0.30 m)
Weight	69 lb (31.3 kg) Carried by 2 personnel
No. in set	3 (erection)

Panel Pin

Length	2 ft 4-1/2 in (0.72 m)
Diameter	1-3/4 in (4.44 cm)
Weight	19 lb (8.62 kg) Carried by 1 person
No. in set	92 (bridge) 20 (erection) 1 (link)

Post Tensioning Assembly (PT)

Length	9 ft 4-1/16 in (2.85 m)
Width	2 ft 3-3/4 in (0.71 m)
Height	2 ft 10-1/16 in (0.87 m)
Weight	657 lb (298 kg)
	Carried by 6 personnel
No. in set	5 (link)

Puller

Length	2 ft 4-1/4 in (0.57 m)
Weight	33 lb (15 kg)
	Carried by 1 person
No. in set	7 (for davit posts and jacking brackets and post tensioners) (link)

Push Bar Adapter

Length	4 ft 3 in (1.30 m)
Width	1 ft 3/4 in (0.32 m)
Height	3-1/4 in (0.08 m)
Weight	100 lb (45 kg)
	Carried by 2 personnel
No. in set	2 (erection)

Push Bar Cross Girder (PBCG)

Length	9 ft 3-1/4 in (2.83 m)
Width	6 in (0.15 m)
Depth	10 in (0.25 m)
Weight	86 lb (39 kg)
	Carried by 2 personnel
No. in set	2 (erection)

Push Bar Long (PB)

Length	15 ft 8-3/16 in (4.78 m)
Width	4-5/8 in (0.12 m)
Depth	4-1/16 in (0.10 m)
Weight	119 lb (54 kg)
	Carried by 2 personnel
No. in set	2 (link)

Push Bar Short (PB)

Length	10 ft 7-1/4 in (3.23 m)
Width	4 in (0.1 m)
Depth	4 in (0.1 m)
Weight	95 lb (43 kg)
	Carried by 2 personnel
No. in set	2 (erection) 2 (link)

Ratchet Wrench 3/4 In

Length	1 ft 10-112 in (0.57 m)
Weight	5 lb (2.3 kg)
	Carried by 1 person
No. in set	3 (link)

Retainer Clip

Length	4-1/8 in (0.1 m)
Weight (bag of 50)	2 lb (0.91 kg)
	Carried by 1 person
No. in set	200 (bridge)
	56 (erection)
	150 (link)

Rocking Roller

Length	2 ft 1-9/16 in (0.65 m)
Width	2 ft 11-7/16 in (0.90 m)
Height	1 ft 1-11/16 in (0.35 m)
Weight	235 lb (107 kg)
	Carried by 4 personnel
No. in set	3 (link)

Roller Beam (RB)

Length	15 ft 5-112 in (4.71 m)
Width	11 in (0.28 m)
Height	1 ft 5-7/8 in (0.45 m)
Weight	320 lb (145 kg)
	Carried by 4 personnel
No. in set	4 (erection)

Rubber Bumper

Weight	86 lb (39 lkg)
	Carried by 1 person
No. in set	3 (erection)
	2 (link)
	11 (bridge)

Short Ramp

Length	10 ft 1/2 in (3.06 m) overall
	10 ft (3.05 m) effective
Width	1 ft 10 in (0.56 m) overall
Height	9-1/4 in (0.24 m)
Weight	264 lb (120 kg)
	Carried by 4 personnel
No. in set	29 (bridge)

Short Reinforcing Link

Length	6 ft 3-1/2 in (1.92 m)
Width	1 ft 2-1/16 in (0.36 m)
Depth	3-15/16 in (0.10 m)
Weight	77.5 lb (35 kg)
	Carried by 2 personnel
No. in set	4 (link)

Strap, 5,000 lb

Length	21 ft 8 in (6.60 m)
Weight	4 lb (1.81 kg)
	Carried by 1 person
No. in set	44 (bridge)
	8 (link)
	12 (erection)

Strap 10,000 lb

Length	23 ft (7.01 m)
Weight	6 lb (2.72 kg)
	Carried by 1 person
No. in set	99 (bridge)
	18 (link)
	27 (erection)

Sway Brace

Length	10 ft 1-3/4 in (3.09 m)
Diameter	3-3/8 in (8.57 cm)
Weight	36 lb (16 kg)
	Carried by 1 person
No. in set	19 (bridge)

Tie-Down Lug

Length	7-1/4 in (0.18 m)
Width	4 in (0.91 m)
Weight	2 lb (1 kg)
	Carried by 1 person
No. in set	48 (bridge)
	8 (link)
	16 (erection)

Top Panel (TP)

Length	6 ft 4 in (1.93 m) overall
	6 ft (1.83 m) effective
Width	2 ft 1-1/2 in (0.65 m) overall
Height	1 ft 9-5/8 in (0.55 m)
Weight	385 lb (175 kg)
	Carried by 4 personnel
No. in set	34 (bridge)

Section III. PRINCIPLES OF OPERATION

1-11 INTERFACE OF MGB COMPONENTS

This section describes how the major MGB components work and interface with each other. The use of individual components varies, depending on the type and length of bridge being assembled.

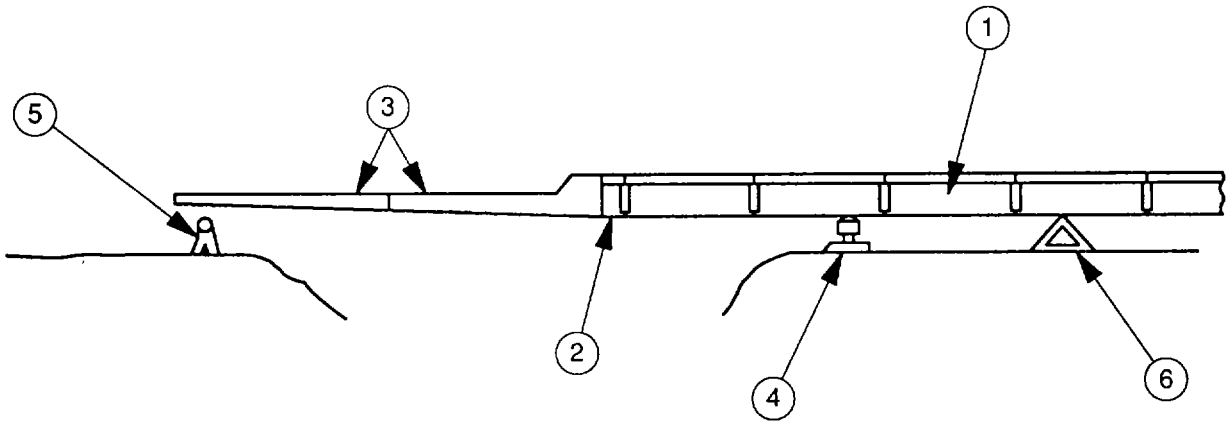


FIGURE 1-4 Launching Single Story Bridges up to 50ft (15.2m)

(1) TOP PANEL. Forms the main girders of the bridge. Top panels are connected to each other and other panels by shootbolts and panel pins, using a guide system to align the panels to enable the panel pins to be inserted.

(2) BANKSEAT BEAM. Provides the spacing between bridge girders and can support MGB's maximum load when bearing along its length. Bankseat beam connects to top panels or end taper panels.

(3) LIGHT LAUNCHING NOSE, FRONT AND REAR. Used as a complete launching nose for 4 thru 8 bay single story bridges and as the forward section of the launching nose on all other bridges. They connect to each other using a launching nose pin. The rear light launching nose connects to the bankseat beam or the launching nose heavy.

(4) ROLLER BEAM ON FIXED SUPPORT AND BASEPLATE. Allows the bridge to be boomed (moved) during assembly or disassembly, using rollers which can be locked. Ground conditions determine whether the roller beam is placed on fixed supports and baseplates during launch of single story bridges.

(5) LANDING ROLLER. Used on far bank to receive the launching nose. Can be used on ground for 4 thru 8 bay single story, or on landing roller pedestal for longer bridges.

(6) BUILDING PEDESTAL. Used under girders to keep bridge off ground during construction of all single story bridges.

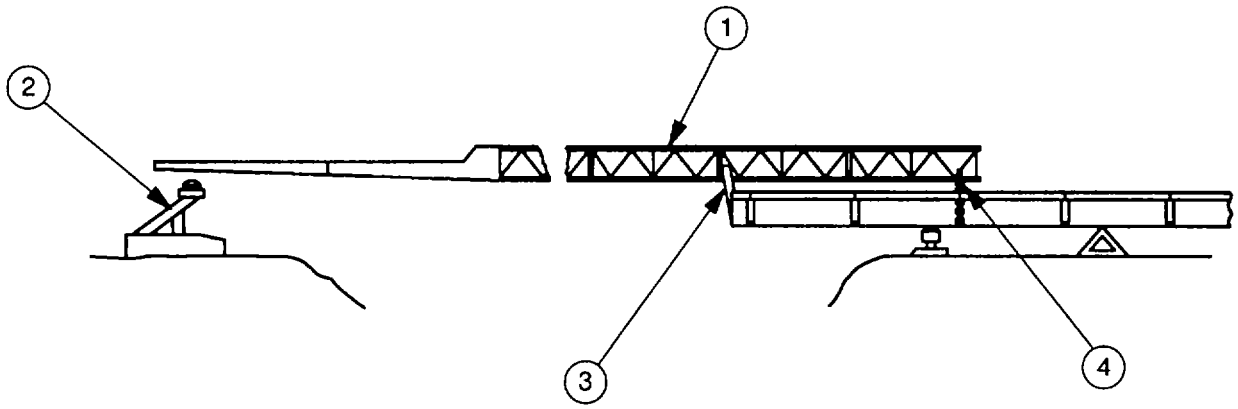


FIGURE 1-5 Launching Single Story Bridges over 50ft (15.2m)

(1) LAUNCHING NOSE HEAVY. Forms the main part of the launching nose on single story bridges over 8 bays and all other bridges. Launching nose heavies connect to each other by shoot bolts and launching nose pins, using a guide system to align the panels to enable the launching nose pins to be inserted.

(2) LANDING ROLLER PEDESTAL. Holds the landing roller and receives the launching nose on the farbank. The Mk 1 landing roller pedestal is used in 9 thru 12 bay single story and 1 thru 22 bay double story bridges. The Mk 2 is used on all link reinforced bridges. The height of the landing roller pedestal is adjusted with a hydraulic jack, 15T for Mk 1 and 20T for Mk 2.

(3) LAUNCHING NOSE ROLLER. Permits movement of launching nose during assembly/disassembly. Provides support and anchorage point for launching nose. Connects to bankseat beam with launching nose pin.

(4) LAUNCHING NOSE CROSS GIRDER AND POSTS. Used to hold near bank end of launching nose in position set for construction and launch.

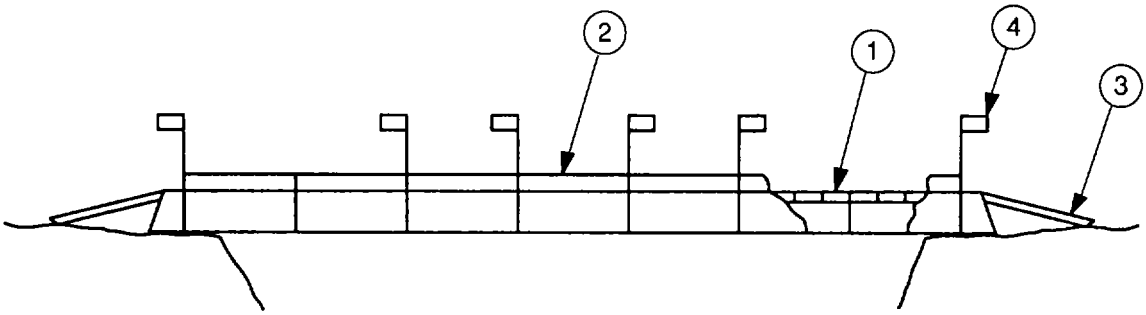


FIGURE 1-6 Single Story Bridge in Place

(1) DECK UNIT. Placed between the main girders to complete the bridge roadway.

(2) CURB. Used to warn drivers of their nearness to the edge of bridge. A curb is used on each top panel.

(3) SHORT RAMP. Used at both ends of bridge allowing vehicles easy access. Short ramps are used on single story bridges only and are hooked onto the bankseat beam.

(4) BRIDGE MARKER GUIDE. Placed at the end of curbs to improve the drivers awareness of the edge of the bridge.

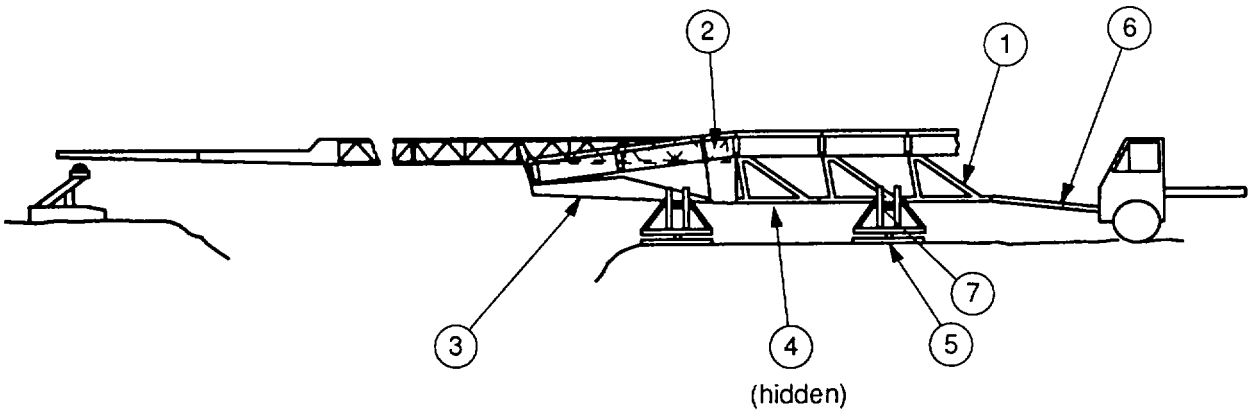


FIGURE 1-7 Launching Double Story Bridges up to 108ft (32.9m)

(1) BOTTOM PANEL. Forms a second, deeper girder that is used on double story and link reinforced MGB. Bottom panels connect to top panels and junction panels by shootbolts and panel pins, using a guide system to align the panels to enable the panel pins to be inserted.

(2) JUNCTION PANEL. Used in double story bridges to connect the sloping end of bridge to the level roadway of bridge.

(3) END TAPER PANEL. Forms a brace between the junction panel and bankseat beam. It provides most of the bearing surface needed for support of the bridge.

(4) SWAY BRACE. Used as a cross member between bottom panels in girders of double story bridges.

(5) FORWARD AND REAR ROLLER BEAM ASSEMBLY. Allows the bridge to be boomed (moved) during assembly or disassembly using rollers, which can be locked. The roller beam is placed on adjustable supports and baseplates which are connected by a frame cross girder. The beam can be raised or lowered using jacks.

(6) PUSH BAR, PUSH BAR ADAPTER AND PUSH BAR CROSS GIRDER. Used when a vehicle is needed to move the bridge. The push bar cross girder is used to connect the push bar to an unfinished bridge. The push bar adapter connects the push bar to the bumper of the truck. Long or short push bars can be used, depending on the length and type of bridge.

(7) HYDRAULIC JACK. The 15 ton jack is used in the adjustable supports and the landing roller pedestal Mk 1. The 20 ton jack is used in the landing roller pedestal Mk 2. Jacks are also used with a jack support connected to the bankseat beam to raise and lower all types of MGB.

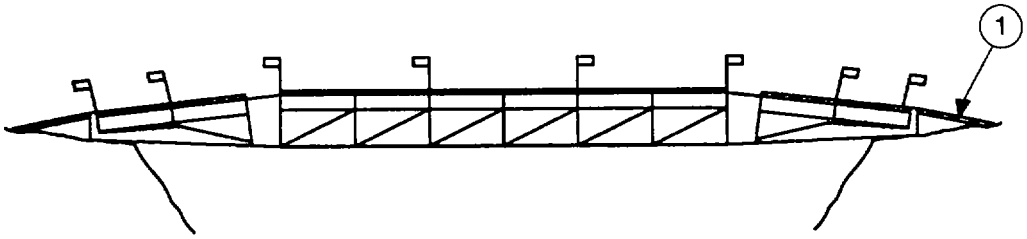


FIGURE 1-8 Double Story Bridge in Place

(1) LONG RAMP. Used at both ends of bridge allowing vehicles easy access. Long ramps are used on all double story and link reinforced bridges and are hooked onto the bankseat beam.

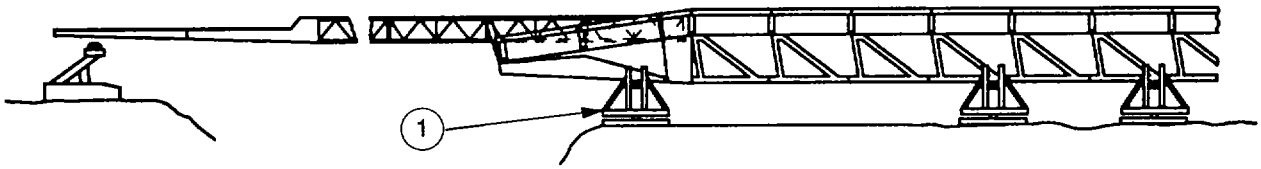


FIGURE 1-9 Launching Bridges over 108ft (32.9m)

(1) CAPSILL ROLLER BEAM ASSEMBLY. Used with the forward and rear roller beam to allow the bridge to be boomed (moved) during assembly or disassembly. The capsill roller beam has rocking rollers and is placed on adjustable supports and baseplates which are connected by a frame cross girder. The beam can be raised or lowered using jacks and is used on all bridges over 12 bays long.

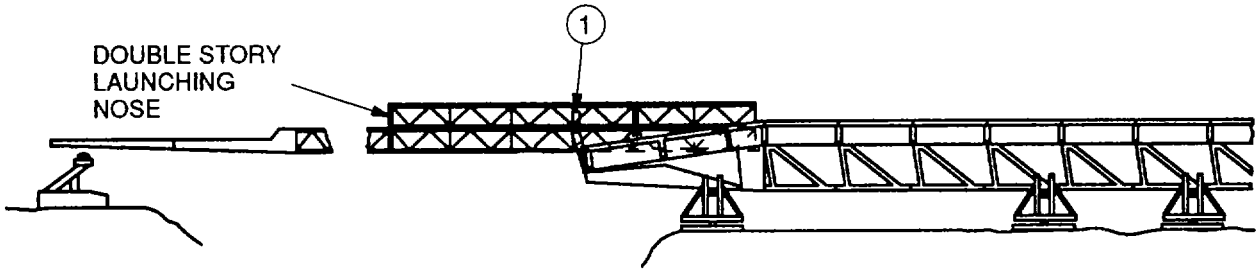


FIGURE 1-10 Launching Bridges from 144ft (43.9m) to 162ft (49.4m)

(1) LAUNCHING NOSE LINK. Connects the second story launching nose to the first story launching nose and the launching nose roller.

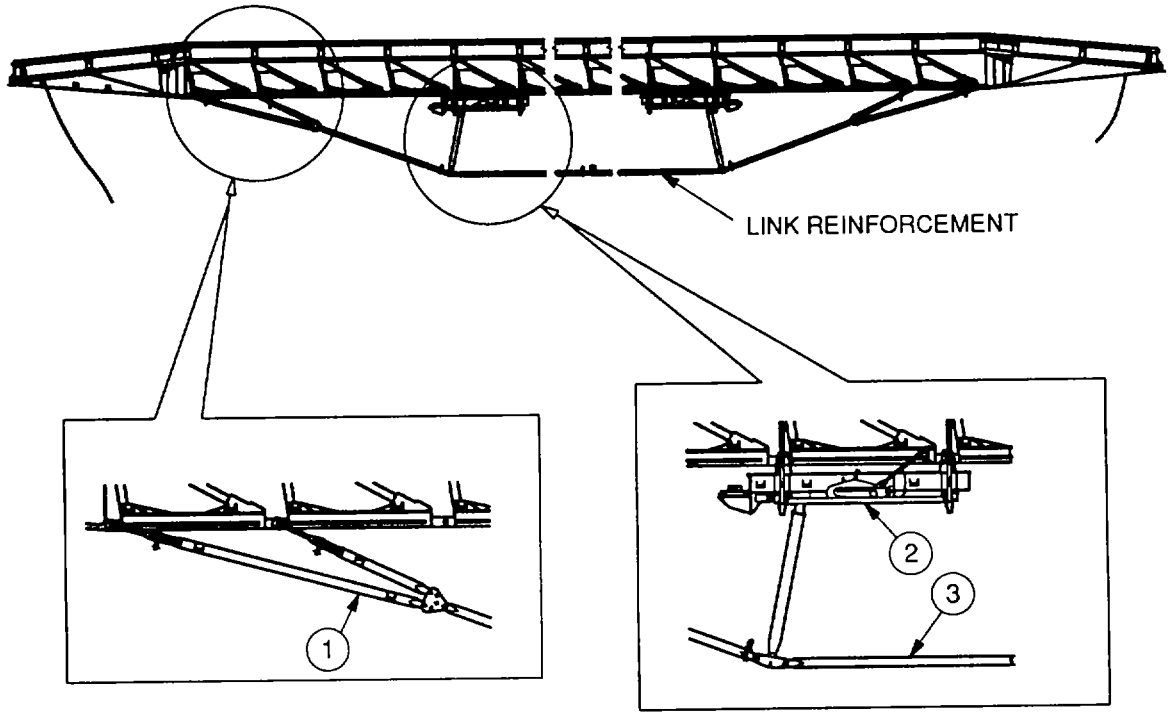


FIGURE 1-11 Link Reinforced MGB in Place

(1) ANCHOR ASSEMBLY. Anchors the chain of links to two of the bottom panel pins at each end of the bridge.

(2) POSTTENSIONING ASSEMBLY. Used to remove slack from the complete reinforcement system. When the reinforcing post is correctly positioned, nearly vertical, the entire system is tensioned and the bridge reinforced. A cable puller is used to position the tensioning post.

(3) REINFORCING LINK, LONG AND SHORT. Used to reinforce double story bridges. If a bridge has an odd number of bays, one short reinforcing link is used under the same bay on each chain. Links are connected with launching nose pins and have a guide system built into them.

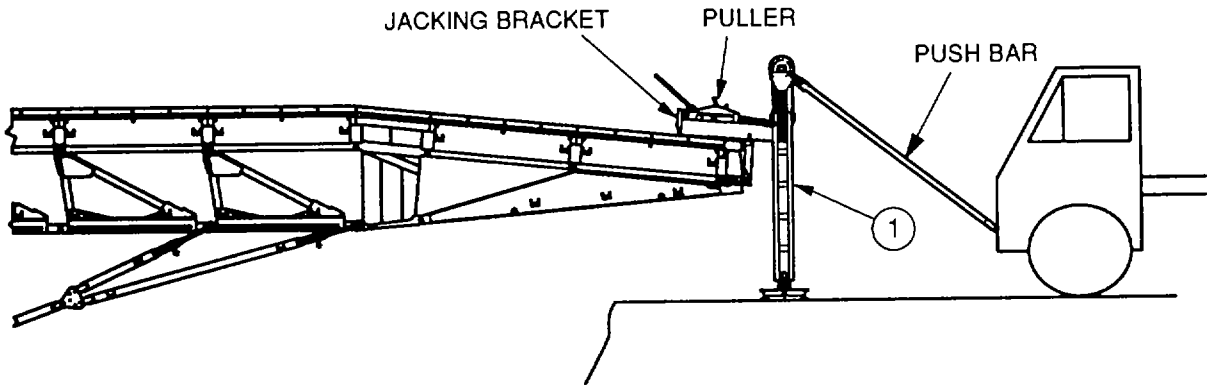


FIGURE 1-12 Lowering End of Bridge using Davits

(1) DAVIT ASSEMBLY. Used with jacking brackets, pullers, double story baseplates and push bars as an alternative to jacks or crane to raise or lower double story and link reinforced MGB.

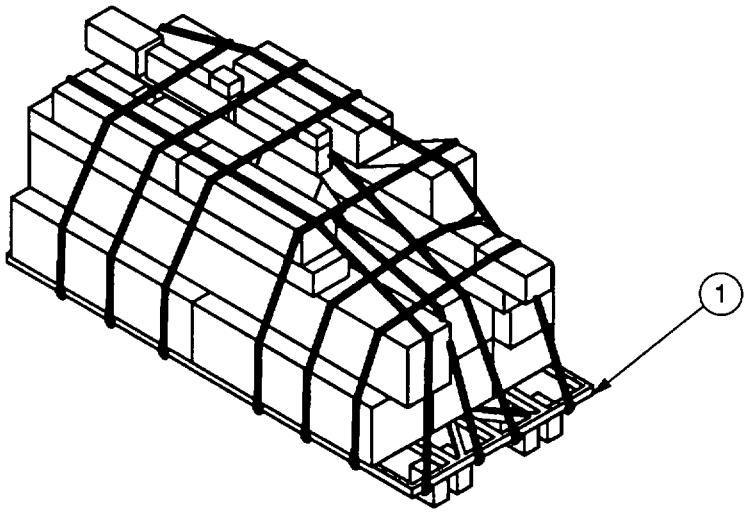


FIGURE 1-13 MGB Components on Pallet for Transportation

(1) PALLET. Used to hold all MGB components for crane loading of trucks and trailers. Components are secured by straps connected to the pallet shackles. Rubber buffers at the front and rear buffer assembly absorb the shock of the pallet when it hits the ground during off-loading.

CHAPTER 2
UNIT MAINTENANCE

Section I. LUBRICATION INSTRUCTIONS

2-1 GENERAL

a. Keep all lubricants in closed containers and store in a clear dry place away from external heat. Allow no dust, dirt, or other foreign material to mix with the lubricants. Keep all lubrication equipment clean and ready to use.

b. Keep all external parts not requiring lubrication clean of lubricants. Before lubricating the equipment, wipe all lubrication points free of dirt and grease. Clean all lubrication points after lubricating, to prevent accumulation of foreign matter.

c. All periodic lubrication is carried out at Operator level. Table 2-1 contains the necessary information to lubricate components after repair.

TABLE 2-1 Component Lubrication.

COMPONENT	LUBRICANT	REMARKS
Bottom panel plunger	Grease Automotive and Artillery (GAA) MIL-G-10924	
Tie Down, Cargo Aircraft	Lubricating oil MIL-L-7870A	
Push Bar Short & Long	Lubricating oil MIL-L-7870A	
Hydraulic Jack 15T & 20T	Lubricating oil MIL-L-7870A	Store jacks in upright position.
Davit Post leveling screw Adjustable support leveling screw	Grease Automotive and Artillery (GAA) MIL-G-10924	
Rocking roller, roller assy.	Grease Automotive and Artillery (GAA) MIL-G-10924	
Roller beam, roller assy.	Grease Automotive and Artillery (GAA) MIL-G-10924	
LNCG, roller assy.	Grease Automotive and Artillery (GAA) MIL-G-10924	
Launching nose, roller assy.	Grease Automotive and Artillery (GAA) MIL-G-10924	

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

2-2 COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

2-3 SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

Special tools are listed and illustrated in the Repair Parts and Special Tools List (TM 5-5420-212-23P) covering all maintenance for this equipment. Refer to Maintenance Allocation Chart, Appendix B, for tool reference usage.

2-4 REPAIR PARTS

Repair parts are listed and illustrated in the Repair Parts and Special Tools List (TM 5-5420-212-23P) covering all maintenance for this equipment.

Section III. SERVICE UPON RECEIPT

2-5 SERVICE UPON RECEIPT OF MATERIEL

All service upon receipt is performed by the bridge crew (Operator level). Refer to TM5-5420-212-10-1, Chapter 3

Section IV. PREVENTIVE MAINTENANCE CHECKS & SERVICES (PMCS)

2-6 INTRODUCTION

WARNING

Death or serious injury will occur if PMCS is not carried out at the intervals stated in Table 2-2 by a person familiar with the use and application of all MGB components.

a. Before any inspection is done all components must be cleaned by high pressure hose or water and sponge.

b. Before performing the preventive maintenance checks and services detailed in paragraph 2-11 it is important that the inspector is familiar with the use and application of all MGB components (Chapter 1 section II) and the information contained in paragraph 2-7 Corrosion and Cracking and paragraph 2-8 Protective Finishes.

2-7 CORROSION AND CRACKING

a. An early detection of cracks in highly stressed components is essential any delay may result in the complete failure of a component. Cracks less than 3/8 in (10 mm) long must be clearly marked and observed. Cracks over 3/8 in (10 mm) long must be repaired. Any cracks or damage to the paint and/or zinc protective coating must be reported immediately and the necessary repair action taken.

WARNING

If bituminous black material is oozing from a component, with the exception of around seal plates, the component must be closely examined. This may indicate a serious crack which would require repair at Depot Maintenance.

b. The inspection of dismantled components should be carried out visually in great detail and the designated inspector should, in particular, look for the following defects:

(1) Stress Corrosion Cracks. This form of corrosion, inter-crystalline in nature, occurs under the influence of static stress and may occur within the heat affected zones of welded components. It leads to mechanical failure generally in the form of cracking (fig. 2-1).

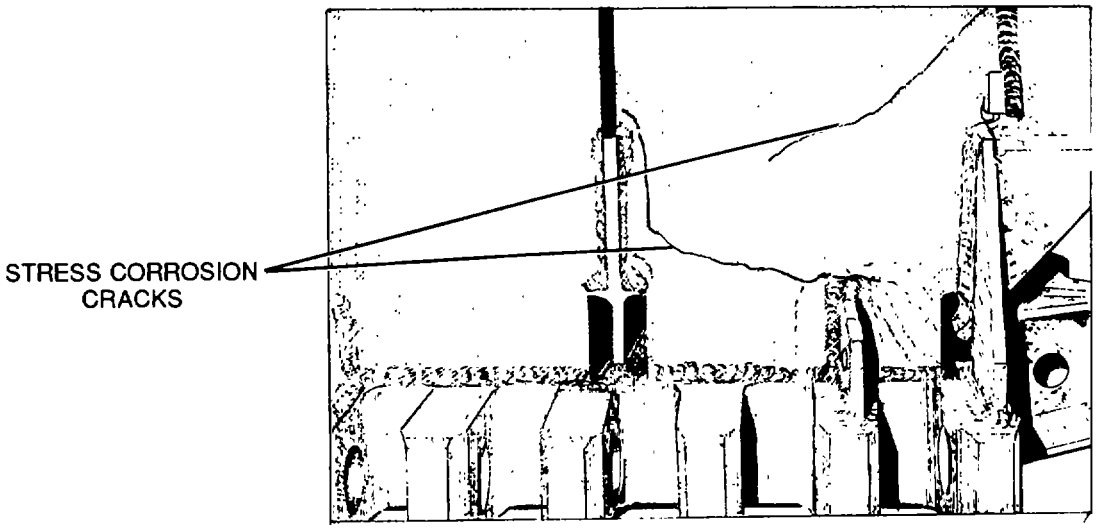


FIGURE 2-1 Stress corrosion cracking

(2) Bi-metallic Corrosion. This generally occurs on aluminum alloy components in contact with steel fastenings where the protective finish has been damaged (fig. 2-2).

FIGURE 2-2 Bi-metallic corrosion

(3) Exfoliation (or layer) Corrosion. This is a less common form of corrosion occurring in alloys with copper or magnesium content. It is often the cause of flaking paintwork (fig. 2-3).

FIGURE 2-3 Exfoliation corrosion

(4) Fatigue Cracking. This type of cracking is unlikely to appear, but may occur in indicator outer jaws where a highly stressed component is approaching the end of its useful life.

(5) Impact Fractures. These are generally caused by careless handling and bad stacking.

(6) Rusting. This occurs where the protective coating on pins has broken down or worn; it can also contribute to bi-metallic corrosion.

(7) Pin Hole Wear. This is the result of frequent building with dirty panel pins. In extreme cases fatigue cracking may occur through excessively loose pins.

(8) Distortion. This is evident especially as elongation of components, this may occur during the later stages of bridge life. Excessive loads or accident damage can also cause distortion. All these may result in the loss of interchangeability of parts.

(9) Weld Cracking. This is usually caused by weld defects and internal stresses. The incidence of cracking is likely to decrease with component usage or aging.

2-8 PROTECTIVE FINISHES

a. Protective finishes are not indestructible, but they are replaceable. Even when properly applied on well prepared surfaces they will gradually deteriorate and eventually fail, although the rate of deterioration is slowed when the right procedures are carried out. The life of a paint system depends on the correct use of appropriate materials skillfully applied and dried under controlled conditions. Inspectors and persons responsible for the condition of protective finishes must be familiar with the signs of various stages and types of deterioration and be able to determine the time and extent of replacement.

b. It is important to avoid delay in repairing paint over protective metal coatings. A broken down paint film retains water and can cause rapid and serious corrosion of a metal coating beneath it. In most cases the most economical policy is to make regular inspections of the structure and to start re-painting as soon as the first signs of paint breakdown become evident. This breakdown, in order of increasing seriousness, generally takes the form of chalking, cracking, blistering and rust staining. As a rule breakdown should not be allowed to proceed beyond the chalking stage because at this point the only preparation required before painting is washing down and drying off.

c. The materials used to replace the protective finish are listed in the Expendable and Durable Supplies and Materials List (13 thru 20, Appendix C), and must be applied in accordance with TM 43-0139, Painting Instructions for Army Materiel.

d. The more typical faults to look for are listed below.

(1) Chalking. This is the formation of a powdery coating on the surface of the paint film and is an indication that the finish coating has begun to break down. In severe cases of chalking the powdery coating will be transferred to the hand when rubbed.

(2) Cracking. Generally this is the splitting of a dry paint film as a result of aging. Several terms are used under this heading to indicate the extent of the fault.

(a) Hair Cracking. These cracks normally occur in isolated patches and do not penetrate the top coat. At this stage only slight preparation is required before painting.

(b) Checking. This is the extension of hair cracking and covers the whole surface with a small pattern (fig. 2-4).

FIGURE 2-4 Paint checking

(c) Cracking. This term is specifically used when at least one paint coat is affected and the complete paint system is likely to fail (fig. 2-5).

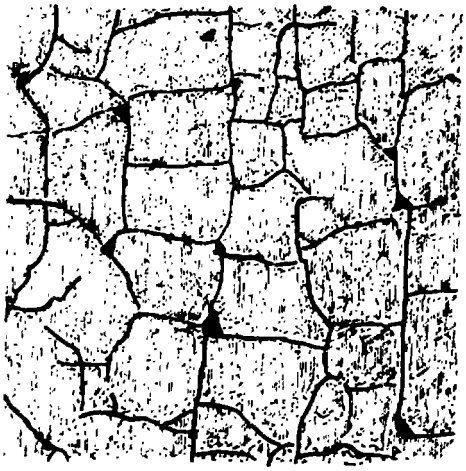


FIGURE 2-5 Paint cracking

(d) Crocodiling or Alligatoring. A drastic type of chalking producing a pattern resembling the crocodile or alligator hide (fig. 2-6). This kind of fault requires considerable preparation to remove the pattern down to a suitable substrate for re-painting.

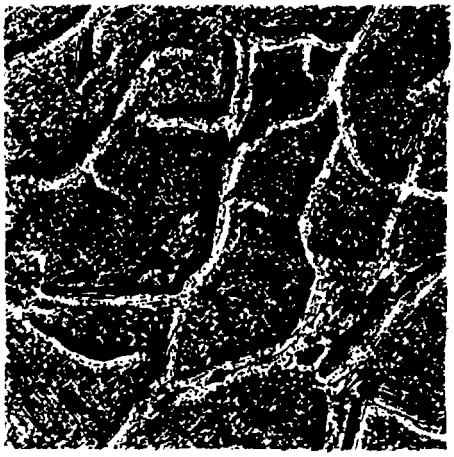


FIGURE 2-6 Paint crocodiling

(3) Severe Cissing. Figure 2-7 shows this effect which is caused by painting over grease or oil contamination. This may affect the base or undercoat or only the finish coat. In any event the whole of the area affected must be cleaned down to the coating below the cissing. Figure 2-8 shows the same effect caused by applying incompatible types of paint in this case a red oxide primer and a polyurethane based finish coat. This fault should be cleaned down to the substrate and the correct paint specification applied.

FIGURE 2-7 Paint cissing contaminated surface

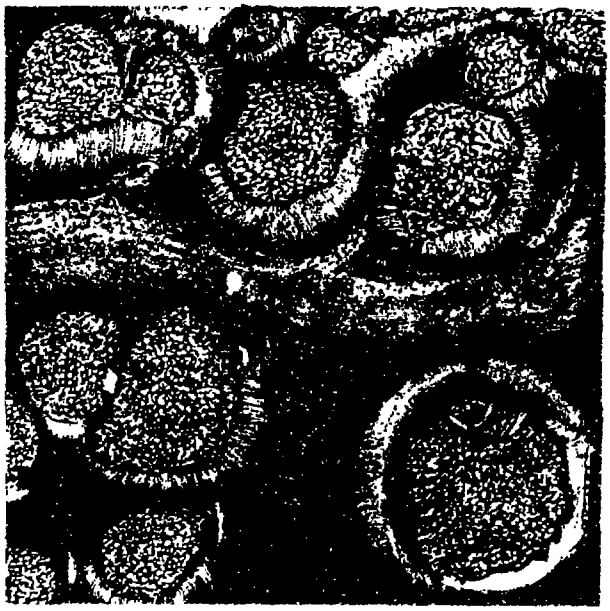


FIGURE 2-8 Paint cissing incompatible coatings

(4) Blistering. Although this fault is obvious in appearance,(ie., dome shaped projections or blisters) the cause may not readily be noticed. In any event the blisters will most certainly be retaining harmful agents, such as water vapor or gases, against the substrate. For this reason alone blistered paint should be cleaned down to the substrate and the cause eliminated. Figure 2-9 shows blisters caused by aging of the paint system and corrosion of the substrate.

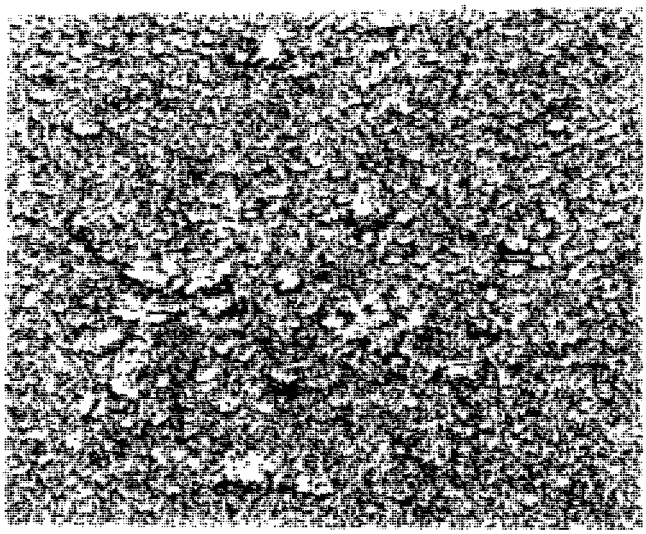


FIGURE 2-9 Paint blistering

(5) Rust Staining. Red and yellow oxides produced from ferrous metals show as rust stains on what appears to be a reasonable paint surface. In fact they indicate that small fissures have developed and the metal substrate has begun to corrode. This fault should be cleaned down to the substrate.

(6) Flaking or Peeling. This fault is the most easily confused condition. Paint is caused to flake by numerous conditions some of which are avoidable mistakes in application or pretreatment, and not, as commonly thought, by a deterioration in the paint film. In all cases where the paint film adhesion has deteriorated so that the paint is lifting and flaking, the extent of the damage and the general condition of the entire component must be considered before a repair decision is made. If the damage is very localized, the affected area only should be repaired in the form of patch painting. But in the event of a general deterioration, for example upwards of 10% in patches of the total surface area, localized repair would be false economy and a complete re-treatment should be authorized.

(7) Figure 2-10 shows the underside of a paint flake contaminated with rust, oil and chalk.

(8) Figure 2-11 shows a flaking paint system caused by the omission of primer pretreatment.

(9) Figure 2-12 shows a badly flaking paint system that requires cleaning to a suitable substrate and renewal of the paint system. This illustration is a direct extension of Figure 2-9 where the paint was blistered.

FIGURE 2-10 Paint flake

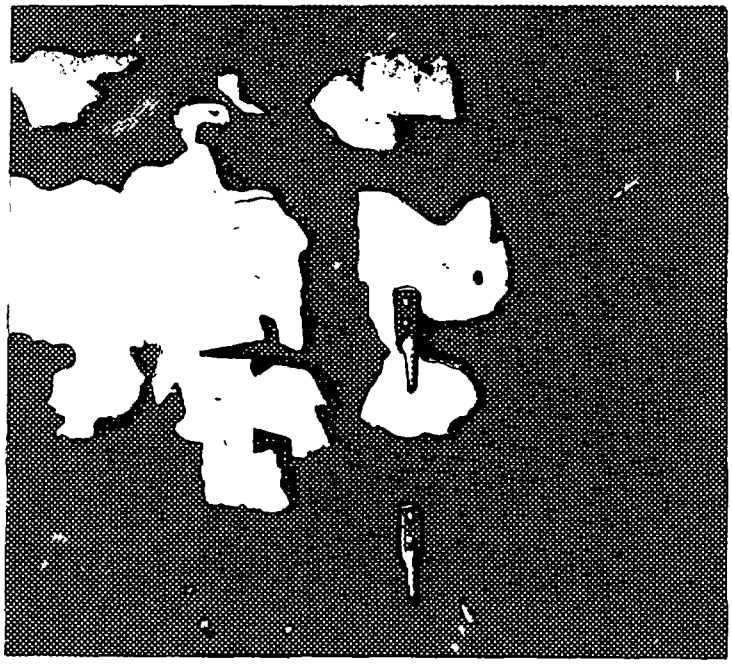


FIGURE 2-11 Omission of paint primer

FIGURE 2-12 Severe flaking

2-9 LIFTING EQUIPMENT

The officer in charge of a maintenance operation must ensure that all lifting equipment (jacks, pullers, pallet shackles, davits, lifting slings, extractor cable) are serviceable.

2-10 FREQUENCY OF PMCS

The frequency of Unit PMCS depends on the category of bridge as shown in Table 2-2.

TABLE 2-2 Unit Frequency of Preventive Maintenance Checks and Services.

USAGE CATEGORY	FREQUENCY (BASED ON MLC 70)	PMCS
Bridge erected and in combat use. Withdraw from service.	Annually or after 500 full load crossings whichever comes sooner (see note)	Full Technical PMCS (Table 2-3)
Engineer training with frequent assembly, trafficking and disassembly.	Annually or after 500 full load crossings whichever comes sooner (see note)	Full Technical PMCS (Table 2-3)
Reserve storage units not in use.	Annually	Unit Visual PMCS - Bridge Disassembled Obvious signs of damage and deterioration.
	Every 5 years	Full Technical PMCS (Table 2-3)
All holdings of MGB	Every 5 years	Full Technical PMCS (Table 2-3)

NOTE: As bridge sets approach the end of their fatique life these examinations may be required annually or after every two hundred and fifty full load crossings, at the discretion of the bridge commander.

2-11 PREVENTIVE MAINTENANCE CHECKS AND SERVICES

a. Preventive Maintenance Checks and Services. Refer to Table 2-3 for PMCS which shall be preformed at specified intervals by Unit maintenance personnel. Following is the columnar headings, codes, and locations designations used in the table.

(1) Item Number Column. Item numbers are assigned consecutively to each check or service task

(2) Interval Column. The interval columns are divided into two categories: annually or every five years. The frequency of the Unit PMCS depends on the category of the bridge as shown in Table 2-2. The components must be disassembled from bridge and be removed from pallets.

(3) Items to be Inspected Column. This column lists the items/components which are to be inspected/serviced.

(4) The Procedure Column. Tells you how to do the required routine. Carefully follow these instructions. Illustrations are included to assist in locating the part of the MGB requiring the check or service.

(5) Not Fully Mission Capable, If Column. Entries in this column are keyed specifically to the procedure column. A condition that causes the covered equipment to be less than fully ready to perform to assigned mission.

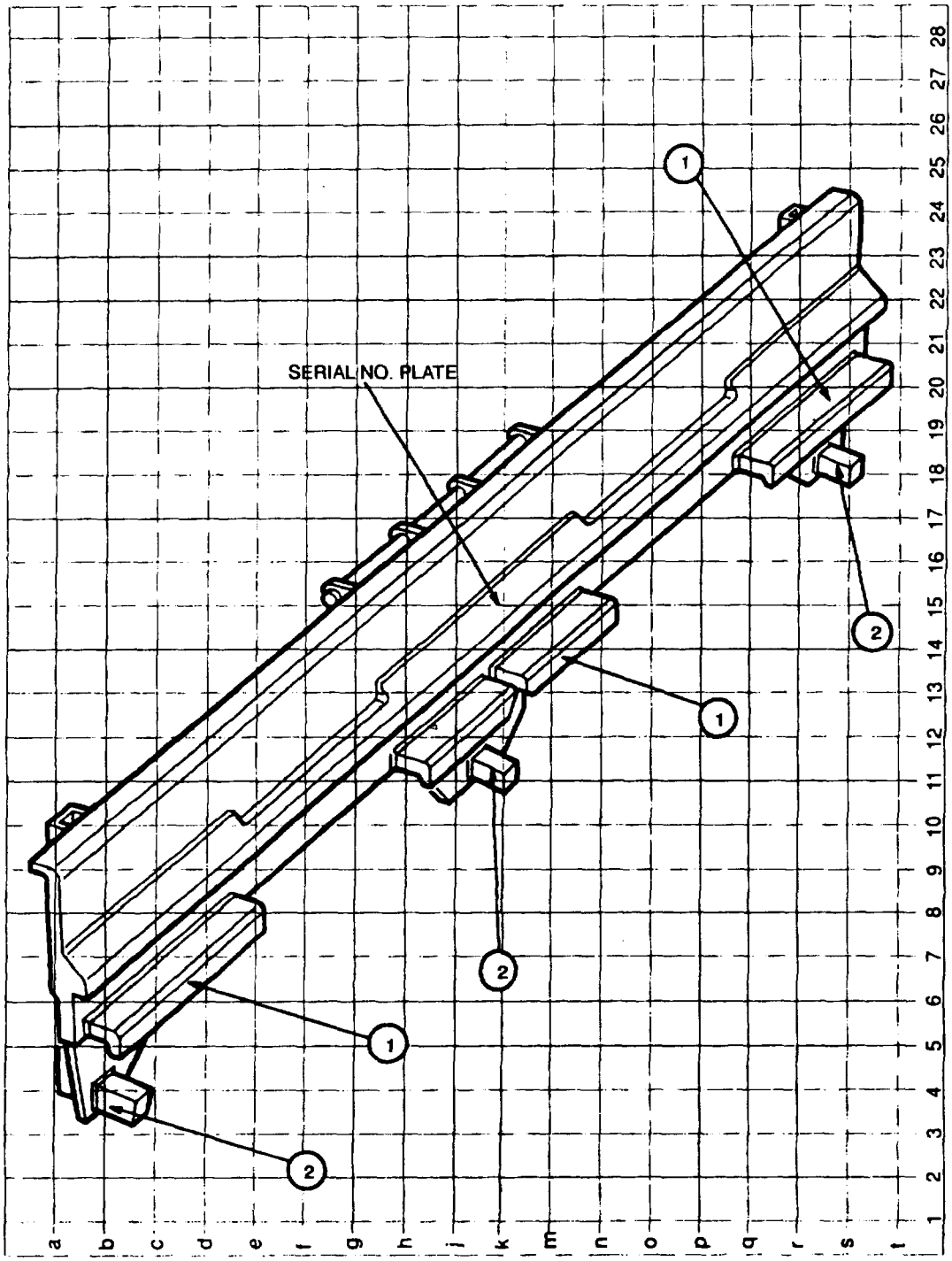
b. Any defective components must be dearly marked with "MARKAL PAINTSTIK" (26, Appendix C). Mark the damaged area and write dearly "DO NOT USE" on an exposed face of the component. Any parts which are damaged but do not render the component unserviceable should be marked in a different color for future repair at the first practical opportunity.

TABLE 2-3 Unit Preventive Maintenance Checks and Services

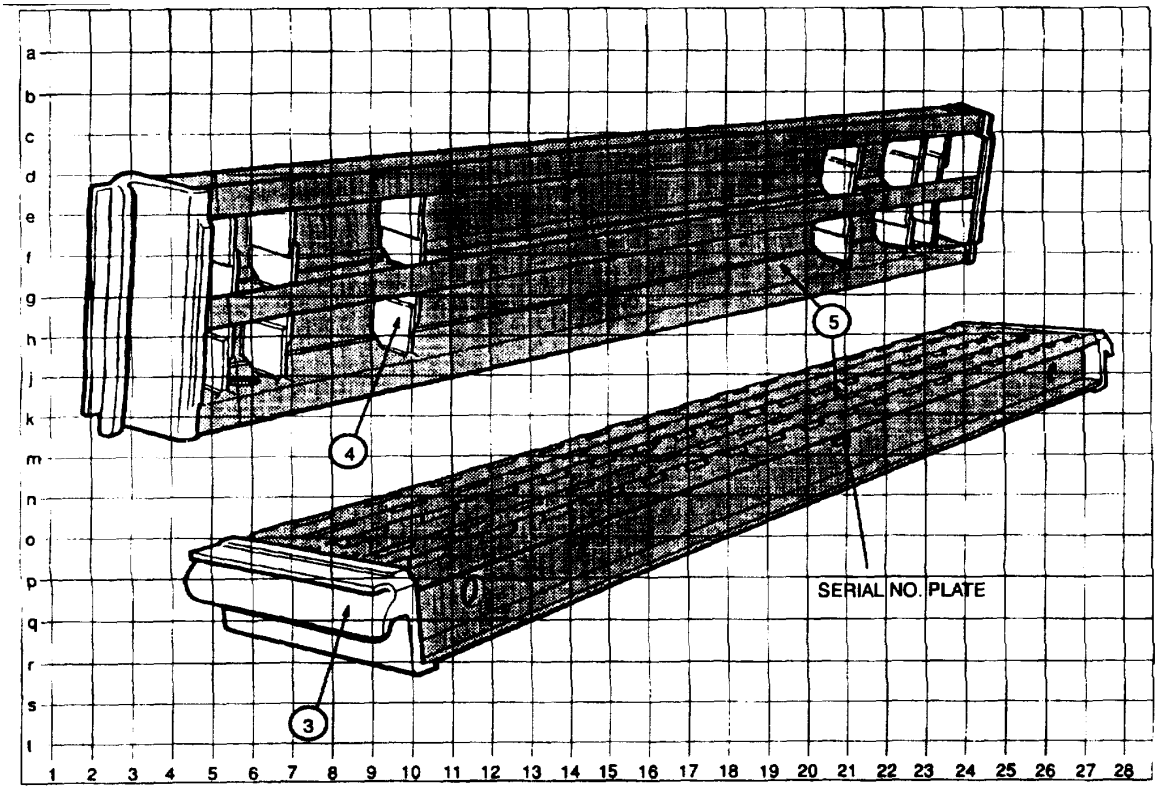
Item No.	Interval	Location: Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If:
a. Bridge Components.				
1	See Table 2-2	Bridge Marker Guide	a. Inspect for obvious damage.	Damage to the bridge marker guide.
			b. Check bolt and wing nut are in place and can be adjusted.	Bolt and wing nut are missing or cannot be adjusted.
2	See Table 2-2	Curb Assembly	a. Check for damage on rail hooks (1) and support blocks (2).	Damaged rail hooks and/ or support blocks.
			b. Check for damage to protective paint film.	

TABLE 2-3 Unit Preventive Maintenance Checks and Services (Continued)

Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:

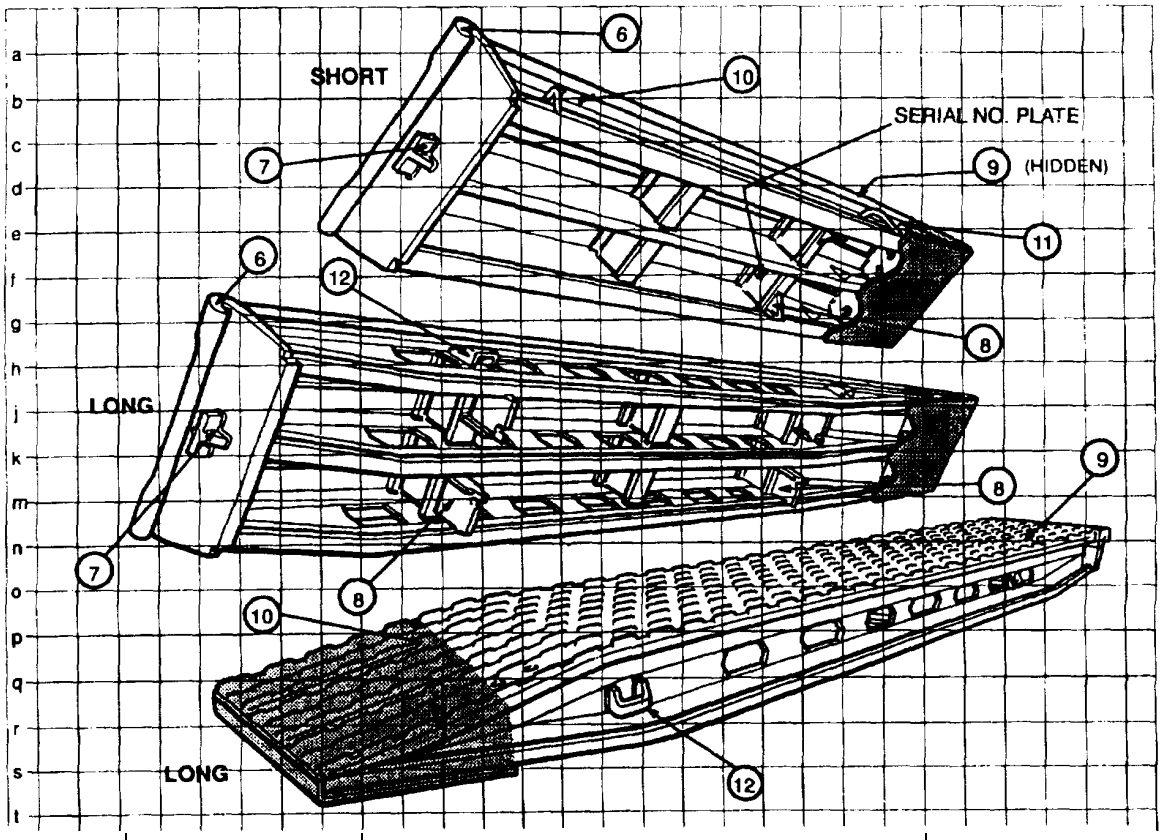


Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
3	See Table 2-2	Deck Unit	a. Check for damage to rail hooks (3). b. Inspect the area around all welds for corrosion, cracking and distortion. Pay particular attention to stiffening plates (4). c. Check for damage to protective paint film (5).	Rail hooks damaged. Evidence of corrosion, cracking and or distortion around all welds, particularly around stiffening plates. Does not affect readiness of the MGB.



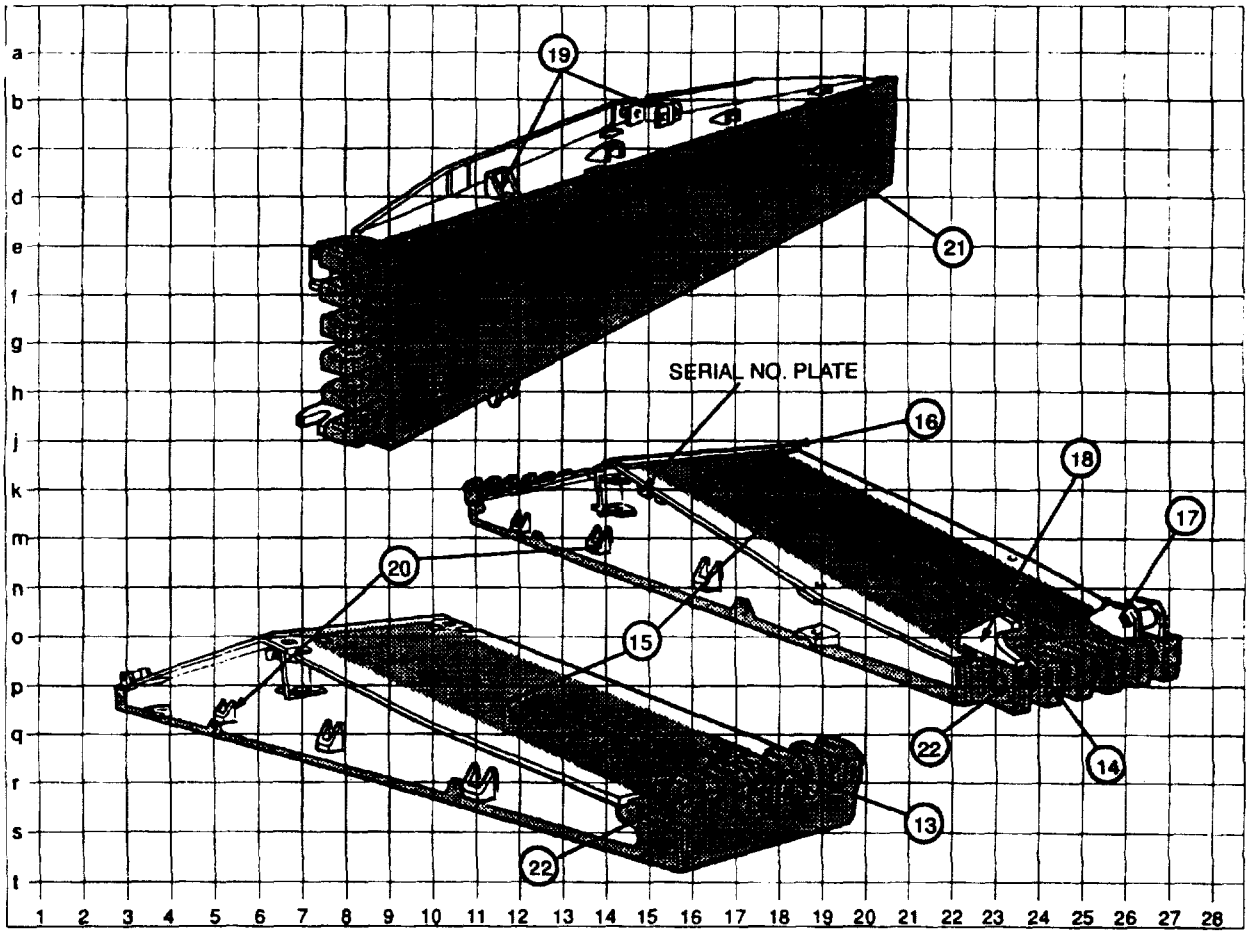
4	See Table 2-2	Ramp Unit (Short or Long)	a. Check for damage to ramp hook (6), anti-lifting lugs (7), and stacking lugs (8). b. Inspect the area around all welds for corrosion, cracking and distortion. c. Check for damage to protective paint film (9).	Damage to ramp hook, anti-rifing lugs, and stacking lugs. Corrosion, cracks and distortion around all welds.

Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
			d. Check carrying handle holes (10) for corrosion, blockage and wear.	Corrosion, blockage and wear to carrying handle holes.
			e. Check security of lifting brackets (11) or carrying bar brackets (12). secure.	Lifting brackets or carrying bar brackets are not

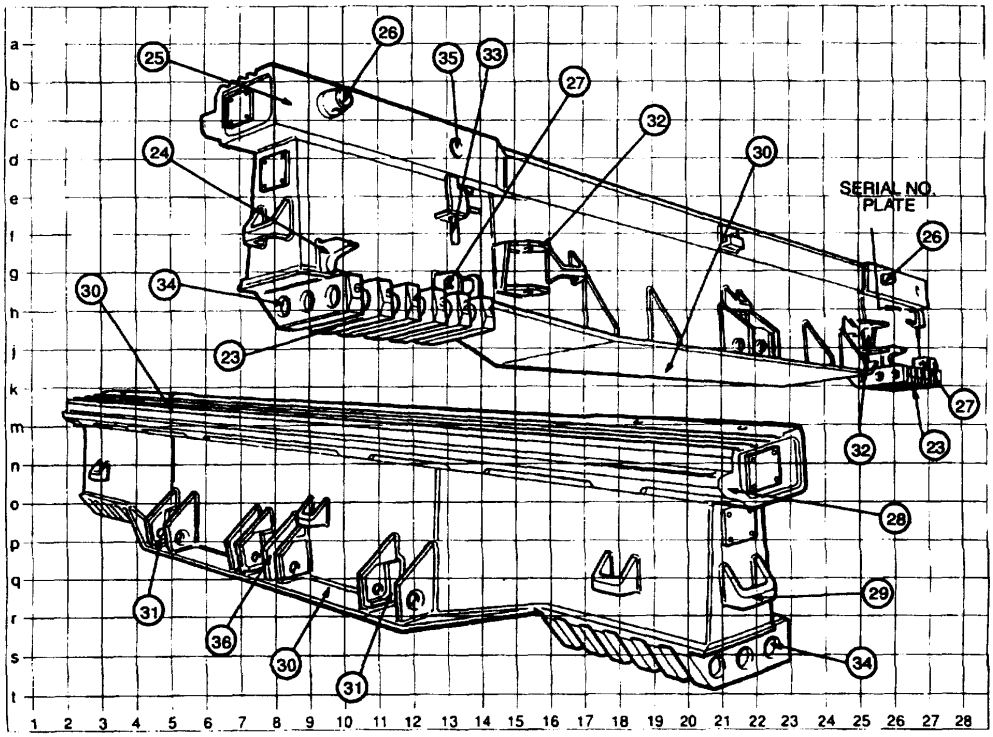


5	See Table 2-2	All pins	Examine pins for distortion, damage, corrosion or heavy scoring.	Evidence of distortion, damage, corrosion or heavy scoring on pins.
6	See Table 2-2	End Taper Panel	a. Check for damage or missing parts to the large (13) and small jaw blocks (14) top plate (15) capping plate (16), to the resilient mount, brackets and pins (17) and guide plate (18). pins and guide plates.	Damaged or missing parts to the large and small jaw blocks, top plate, capping plate, resilient mount, brackets and
			b. Check for damage to swaybrace brackets (19).	Damaged swaybrace brackets.

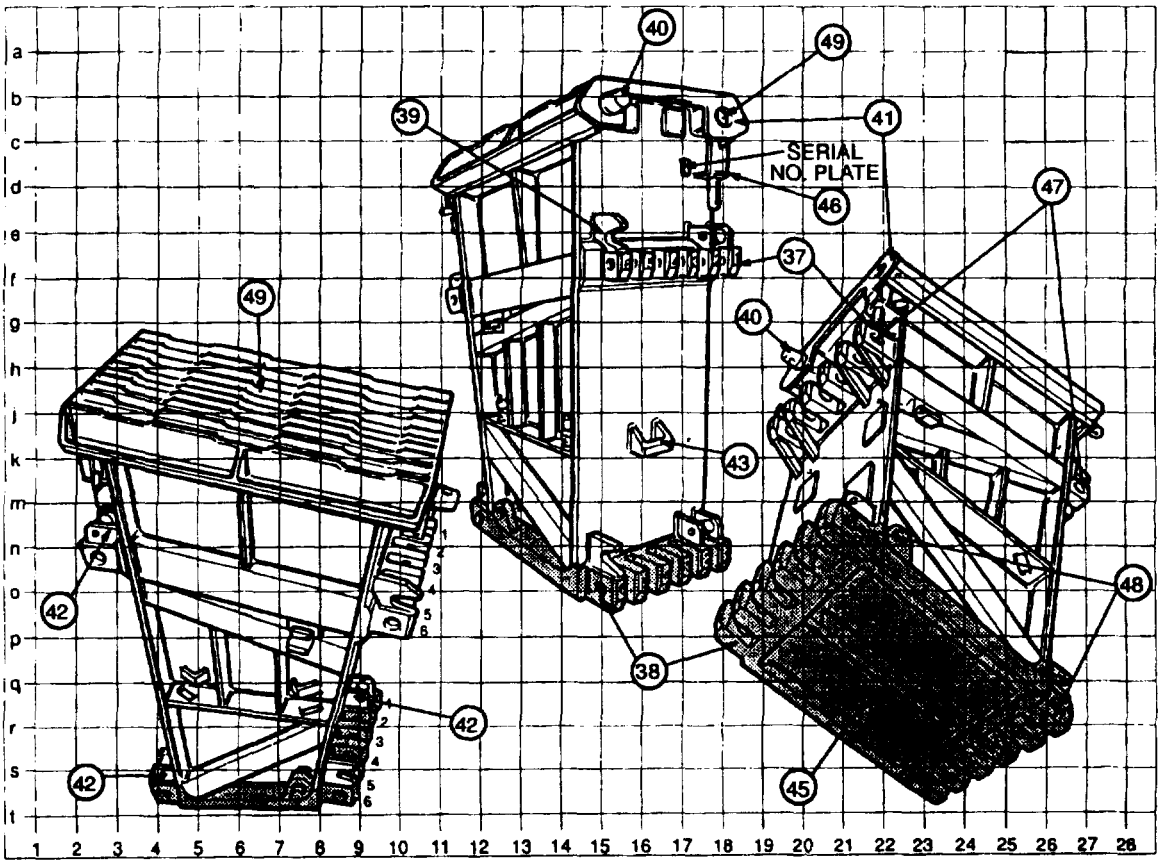
Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
			c. Check for security of carrying bar brackets (20).	Carrying bar brackets are not secure.
			d. Inspect the area around all welds for corrosion and cracking and also on the bottom chord (21).	Evidence of corrosion and cracking around all welds and the bottom chord.
			e. Check for damage to the protective paint film.	
			f. Inspect resilient mount for freedom of movement (17).	Evidence of freedom of movement in resilient mount.
			g. Inspect main pin holes for corrosion and wear (22).	Evidence of corrosion and wear in main pin holes.



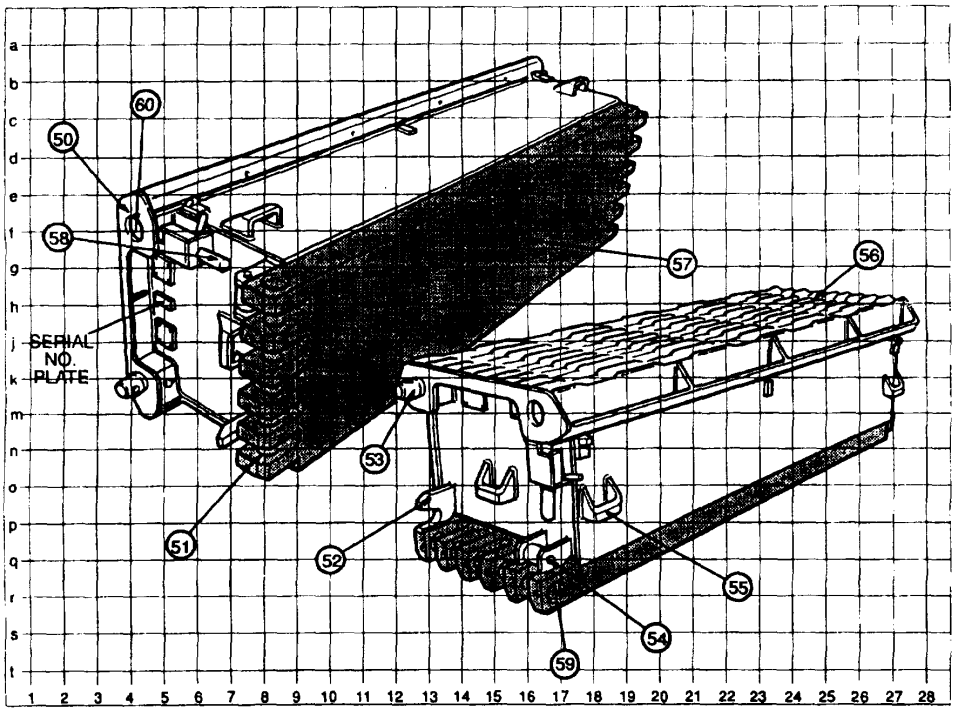
Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
7	See Table 2-2	Bankseat Beam	a. Check for damage to both sets of jaw blocks (23), guide plates (24), compression faces (25), dowel pins (26), resilient mount brackets and pins (27), and ramp shelf (28). and ramp shelf.	Damage to both sets of jaw blocks, guide plates, compression faces, dowel pins, resilient mount brackets and pins,
			b. Check for security of carrying bar brackets (29).	Carrying bar brackets are not secure.
			c. Inspect the area around all welds for corrosion and cracking, distortion and damage and also top and bottom chords (30), jack post brackets (31) and sway brace brackets (32). Pay particular attention to push brackets (36).	Evidence of corrosion, cracks, distortion and damage around all welds, top and bottom chords, jack post brackets, sway bar brace brackets and push bar brackets.
			d. Inspect shoot bolts for security and correct operation (33).	Shoot bolts not secure and not operating correctly.
			e. Check for damage to the protective paint film.	
			f. Inspect resilient mounts for freedom of movement (27), and ensure resilient mount cotter pin is secure.	Freedom of movement in resilient mounts and pins not secure.
			g. Inspect all main pin holes (34), dowel holes (35), jack post bracket (31), push bar brackets (36) and sway brace bracket holes (32) for corrosion, blockage and wear. sway brace bracket holes.	Evidence of corrosion, blockage and wear in main pin holes, dowel holes, jack post bracket, push bar brackets and

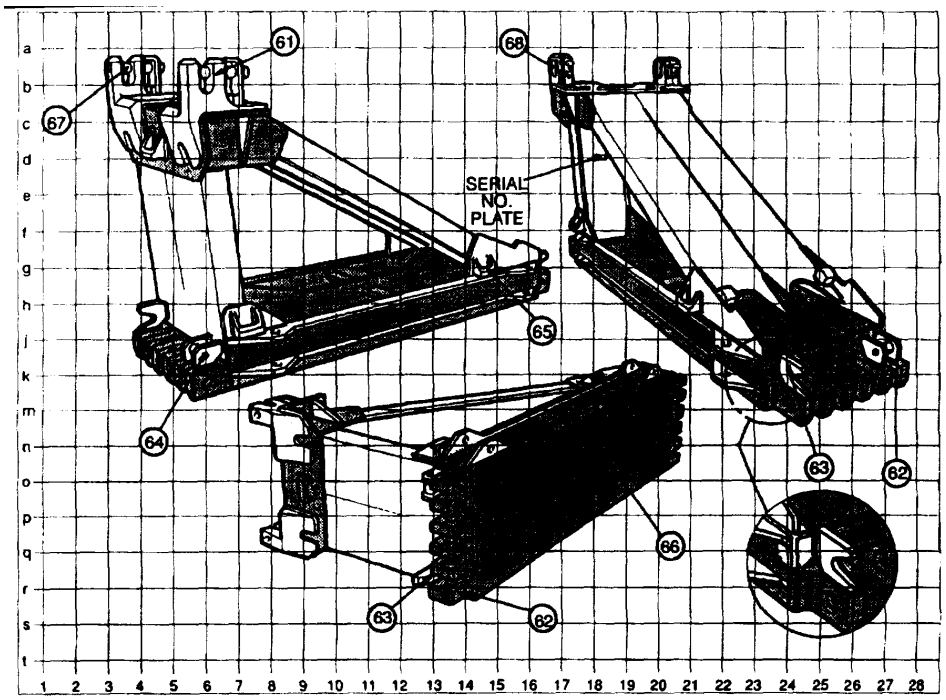
Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
				
8	See Table 2-2	Sway Brace	a. Examine sway brace for damage/distortion. b. Check mounting holes for wear and corrosion. c. Check for damage to the protective paint film.	Damaged/distortion of sway brace. Wear and corrosion in mounting holes.
9	See Table 2-2	Junction Panel	a. Check for damage to upper (37) and lower jaws (38), guide plates (39), dowel pins (40), compression faces (41), resilient mount brackets and pins (42). b. Check for security of carrying bar brackets (43).	Damaged upper and lower jaws, guide plates, dowel pins, compression faces, resilient mount brackets and pins. Carrying bar brackets are not secure.

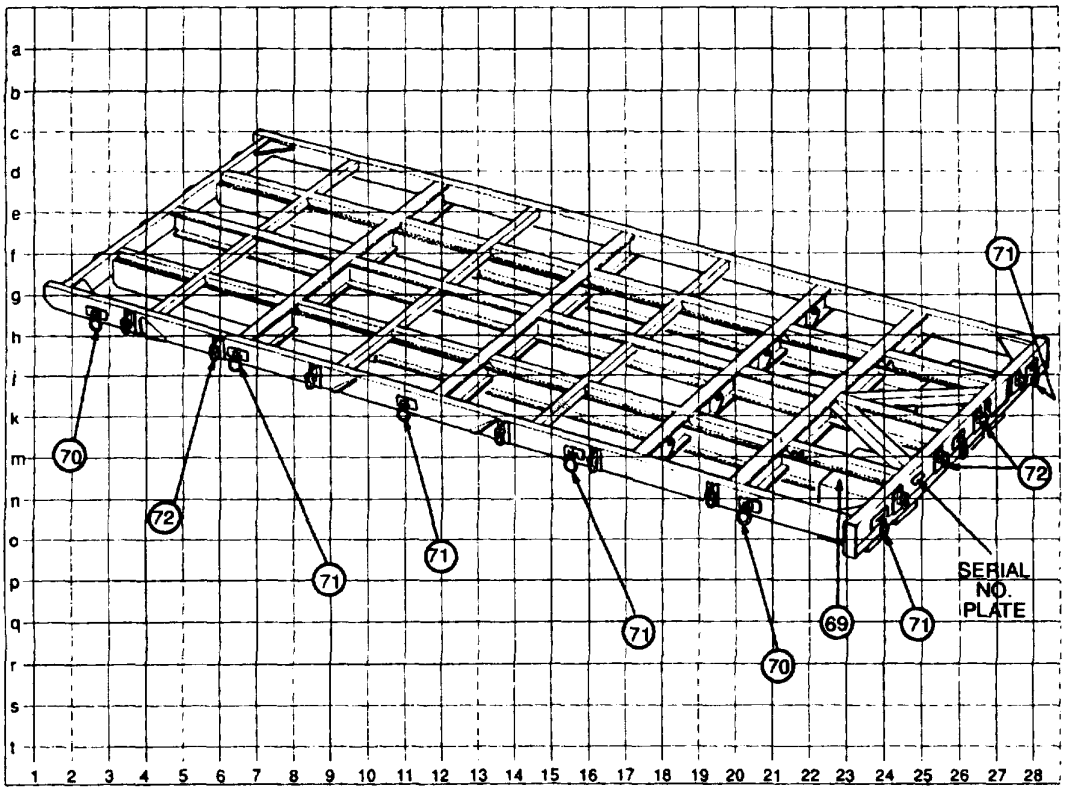
Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
			c. Inspect the area around all welds for corrosion and craddng, distortion and damage and also top (44) and bottom chords (45).	Corrosion, cracks, distortion and damage around all welds and top and bottom chords.
			d. Inspect shoot bolts for security and correct operation (46).	Shoot bolts not secure and not operating correctly.
			e. Check for damage to the protective paint film.	
			f. Inspect resilient mounts for freedom of movement (42).	
			g. Check resilient mount cotter pins for security (42).	
			h. Inspect upper (47), lower main pin holes (48) and dowel holes (49) for corrosion and wear.	Corrosion and wear of upper, lower main pin holes and dowel holes.



Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
10	See Table 2-2	Top Panel	a. Check for damage to compression faces (50), jaws (51), guide plates (52), dowel pins (53) and resilient mount, brackets and pins (54).	Damaged compression faces, jaws, guide plates, dowel pins and resilient mount, brackets and pins.
			b. Check for security of carrying bar brackets (55).	Carrying bar brackets are not secure.
			c. Inspect the area around all welds for corrosion and cracking, distortion and damage and also top (56) and bottom chords (57).	Corrosion, cracks, distortion and damage around all welds and top and bottom chords.
			d. Inspect shoot bolts for security and correct operation (58).	Shoot bolts not secure and not operating correctly.
			e. Check for damage to the protective paint film.	
			f. Inspect resilient mounts for freedom of movement (54), and ensure resilient mount cotter pin is secure.	
			g. Inspect main pin holes (59) and dowel holes (60) for corrosion and wear.	

Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
				
11	See Table 2-2	Bottom Panel	a. Check for damage to top jaws (61) and bottom jaws (62), guide plates (63), resilient mount, brackets and pins (64).	Damaged top jaws, bottom jaws, guideplates, resilent mount, brackets and pins.
			b. Check for security of carrying bar brackets (65).	Carrying bar brackets are not secure.
			c. Inspect the area around all welds for corrosion and cracking, distortion and damage and also the bottom chord (66).	Corrosion, cracks, distortion and damage around all welds and bottom chord.
			d. Inspect shoot bolts and plunger assembly for security and correct operation (67).	Not secure and uncorrect operation of shoot bolts and plunger assembly.
			e. Check for damage to the protective paint film.	
			f. Inspect resilient mount cotter pins (64) and plunger assembly retaining bolts (68) for security.	

Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
				
12	See Table 2-2	Equipment Basket	a. Examine basket for impact damage. b. Ensure lid opens and doses on hinges and locks.	
13	See Table 2-2	Pallet Assembly*	a. Check for bent, broken or cracked framework b. Ensure rubber buffers (69) are firmly secured and in good condition. condition. c. Check there are no missing lifting rings (70), tie down rings (71) or shackles (72).	Framework is bent, broken or cracked. Rubber buffers are not secure and not in good Missing lifting rings, tie down rings or shackles.

Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
				
14	See Table 2-2	Truck Mounted Equipment* damaged.	a. Examine straps for chafing, ensure hooks, buckles are secure and undamaged.	Straps chafed. Hook and buckles not secure or
			b. Examine tie-down lug for damage, cracking.	Damaged or cracked tie-down lug.
			c. Examine aircraft cargo tie-down for damage, check that spring release catches are working and also tension adjuster.	Damaged aircraft cargo tie-down. Spring release catches and tension adjuster not working.
			d. Examine rear buffer assembly to ensure straps and hooks are secure and buffers are serviceable. unserviceable.	Straps and hooks are not secure on rear buffer assembly and buffers are
15	See Table 2-2	Trailer Mounted Equipment*	a. Examine straps for chafing, ensure hooks, buckles are secure and undamaged.	Straps chafed. Hook and buckles not secure or damaged.

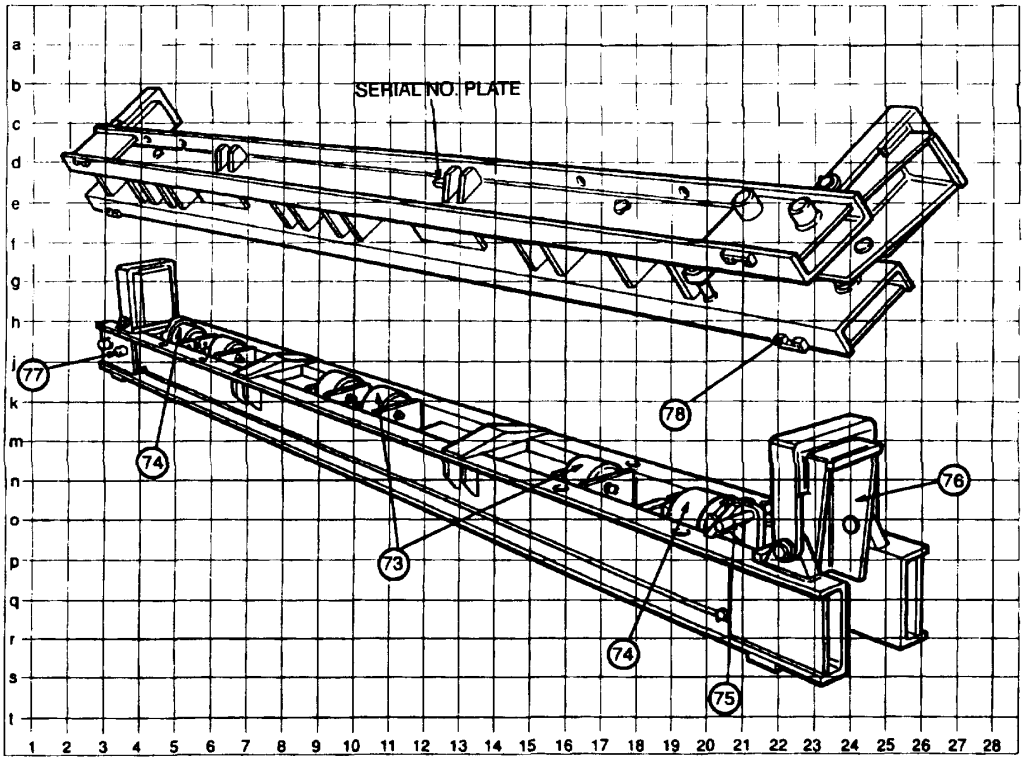
Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
			b. Examine aircraft cargo tie-down for damage, check that spring release catches are working and also tension adjuster.	Damaged aircraft cargo tie-down. Spring release catches and tension adjuster not working.
			c. Examine rear buffer assembly to ensure straps and hooks are secure and buffers are serviceable.	Straps and hooks are not secure on rear buffer assembly and buffers are unserviceable.
			d. Examine pallet adapter for weld damage, cracks, distortion and check adapter brackets for security.	Pallet adapter has weld damage, cracks, or distortion. Adapter brackets are not secure.

*These items are also in Bridge Erection and Link Reinforcement sets.

b. Bridge Erection Components.

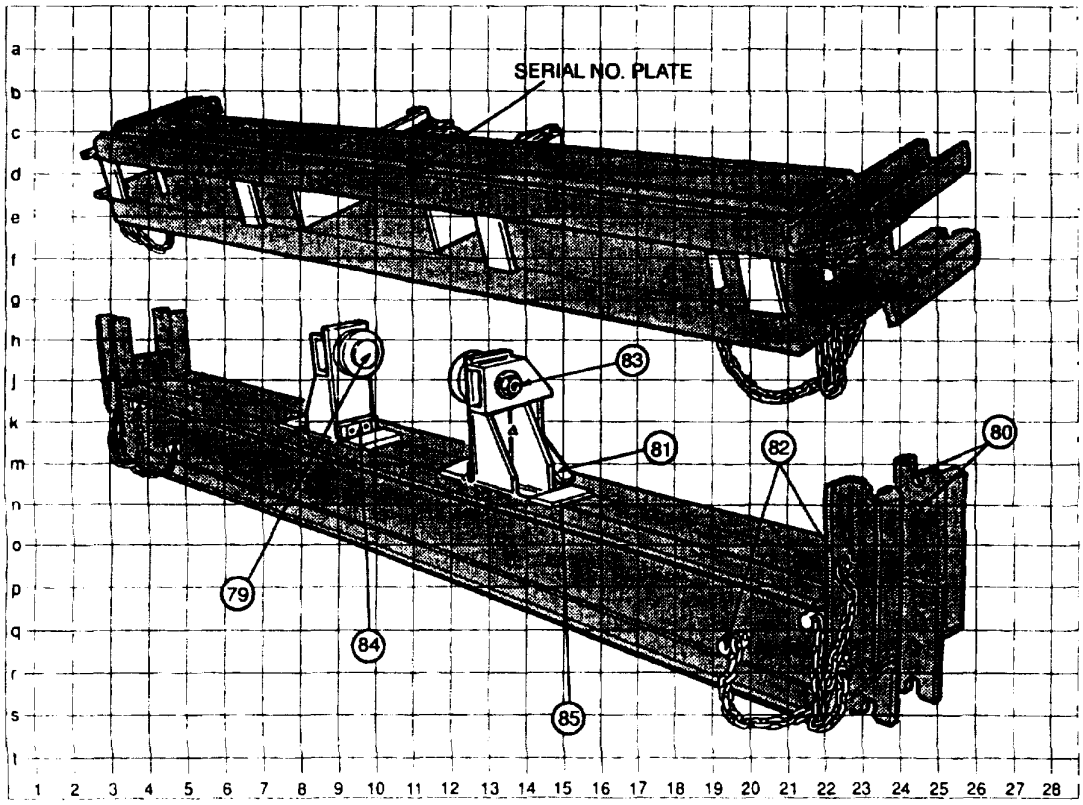
16	See Table 2-2	Push Bar Adapter	Inspect the area around all welds for corrosion and cracking, distortion and damage.	Evidence of corrosion, cracks, distortion and damage around all welds.
17	See Table 2-2	Panel Erection Aid	a. Examine area around all welds for corrosion, cracking, distortion and damage.	Evidence of corrosion, cracks, dissection and damage around all welds.
			b. Check for damage, distortion on locking plate and frame.	Locking plate and frame damaged or distorted.
			c. Examine bracing pins for excessive scoring and security.	
			d. Check rollers for freedom of movement.	
18	See Table 2-2	Push Bar (Short)	a. Examine area around all welds for corrosion, cracking, distortion and damage.	Evidence of corrosion, cracks, distortion and damage around all welds.
			b. Check all holes for wear and corrosion.	Wear and corrosion in all holes.
			c. Check the swivel end for freedom of movement.	Freedom of movement in swivel end.
			d. Check that stencil "Other Side Up" is legible on bottom of bar.	
19	See Table 2-2	Roller Beam Assembly	a. Examine plain rollers (73) and flanged rollers (74) for security, freedom of movement, and severe damage to flanges (74).	Plain rollers and flanged rollers not secure or free to movement. Damaged flanges.

Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
			b. Check the operation of the roller catches (75) and the jacking hoods (76).	Roller catches and jacking hoods not operating correctly.
			c. Check the security of all pins, and check operation of retractable pins (77).	Pins not secure and retractable pins not operating correctly.
			d. Examine beam for damage, distortion and cracks, missing blocks (78). blocks.	Damaged, distortion and cracks in beam. Missing



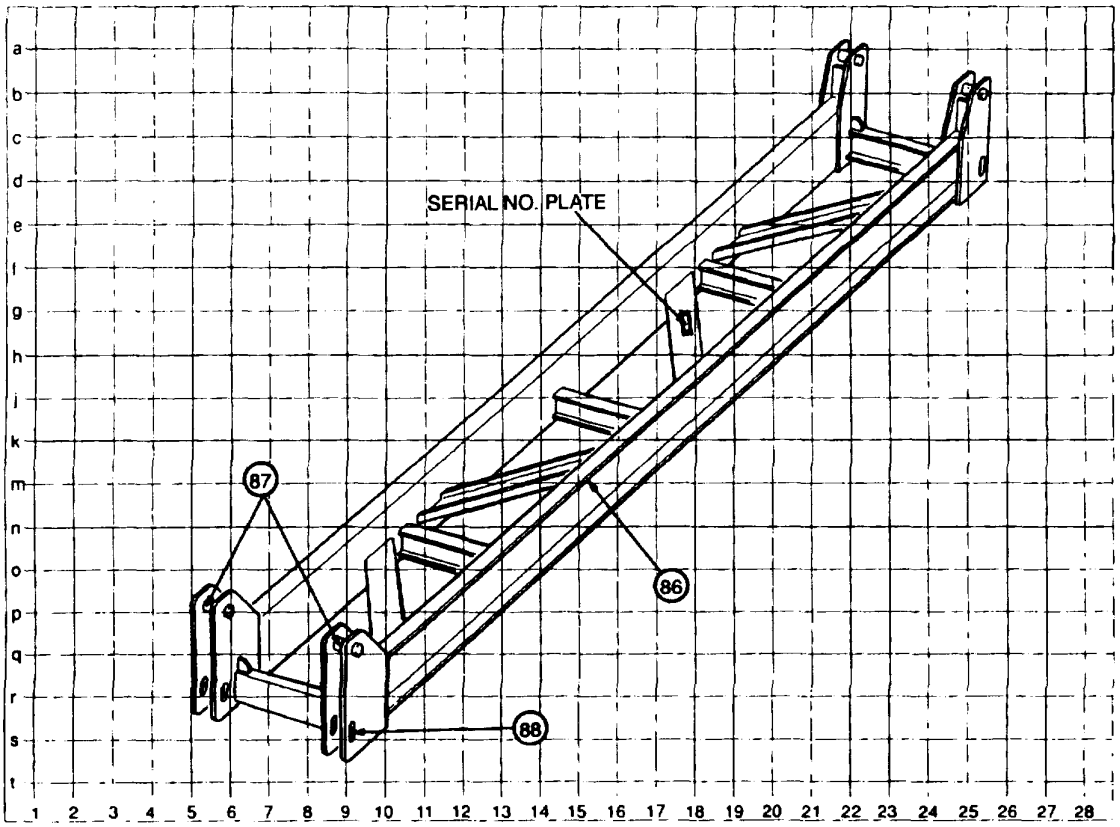
20	See Table 2-2	Extractor Cable	a. Examine cable for damage and wear.	Damaged and worn cable.
			b. Check eyelets are sound and secure.	Eyelets are not sound or secure.
21	See Table 2-2	Launching Nose Cross Girder	a. Check for damage to rollers (79), pin holes and jaws (80) and gravity catch (81).	Damaged rollers, pin holes and jaws, and gravity catch.

Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
			b. Inspect the area around all welds for corrosion and cracking, distortion and damage.	Corrosion, cracks, distortion and damage around all welds.
			c. Check pins and chains (82) for security.	Pins and chains not secure.
			d. Examine rollers for freedom of movement and nuts (83) for security.	Rollers not free to move and nuts not secure.
			e. Check for damage to protective paint film.	
			f. Examine pin holes, jaws and guide blocks (84) for wear and corrosion, and pads (85) for cracking.	Worn and corroded pin holes, jaws and guide blocks. Cracks in pads.

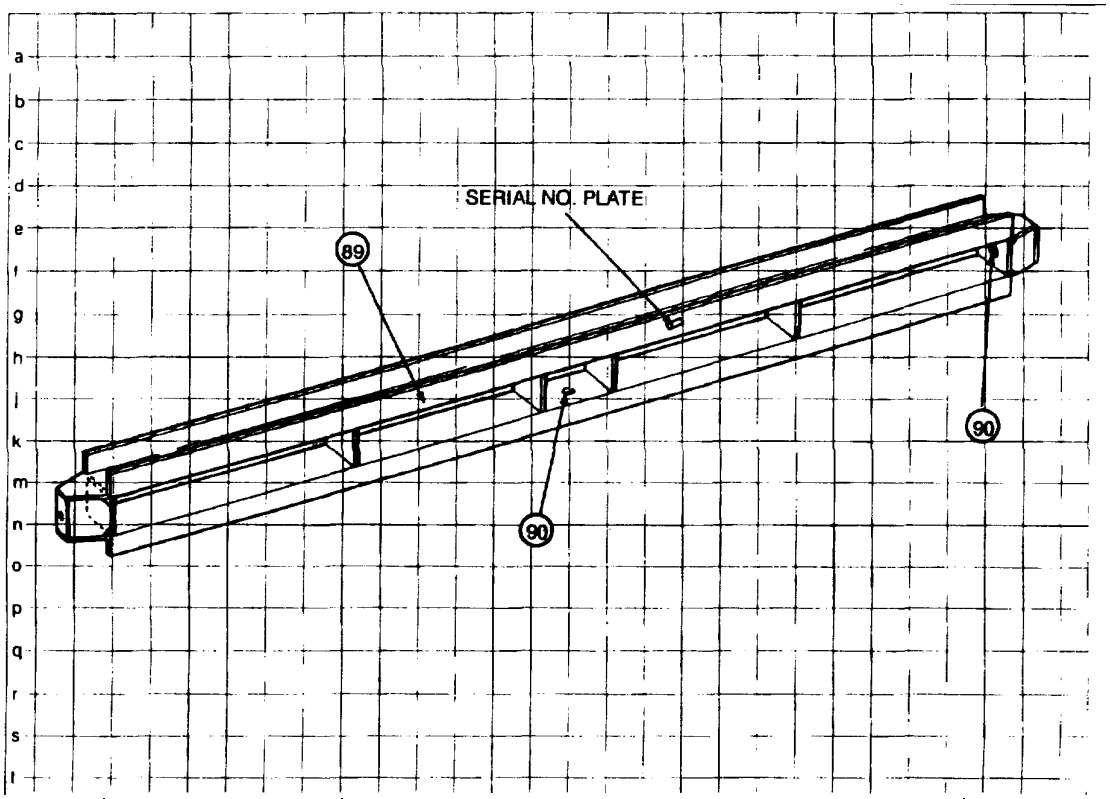


22	See Table 2-2	Frame Cross Girder	a. Check for damage, distortion of frame (86) and dowels (87).	Frame and dowels damaged and distorted.
			b. Check welded joints for cracks and breaks.	Cracks and breaks in welded joints.

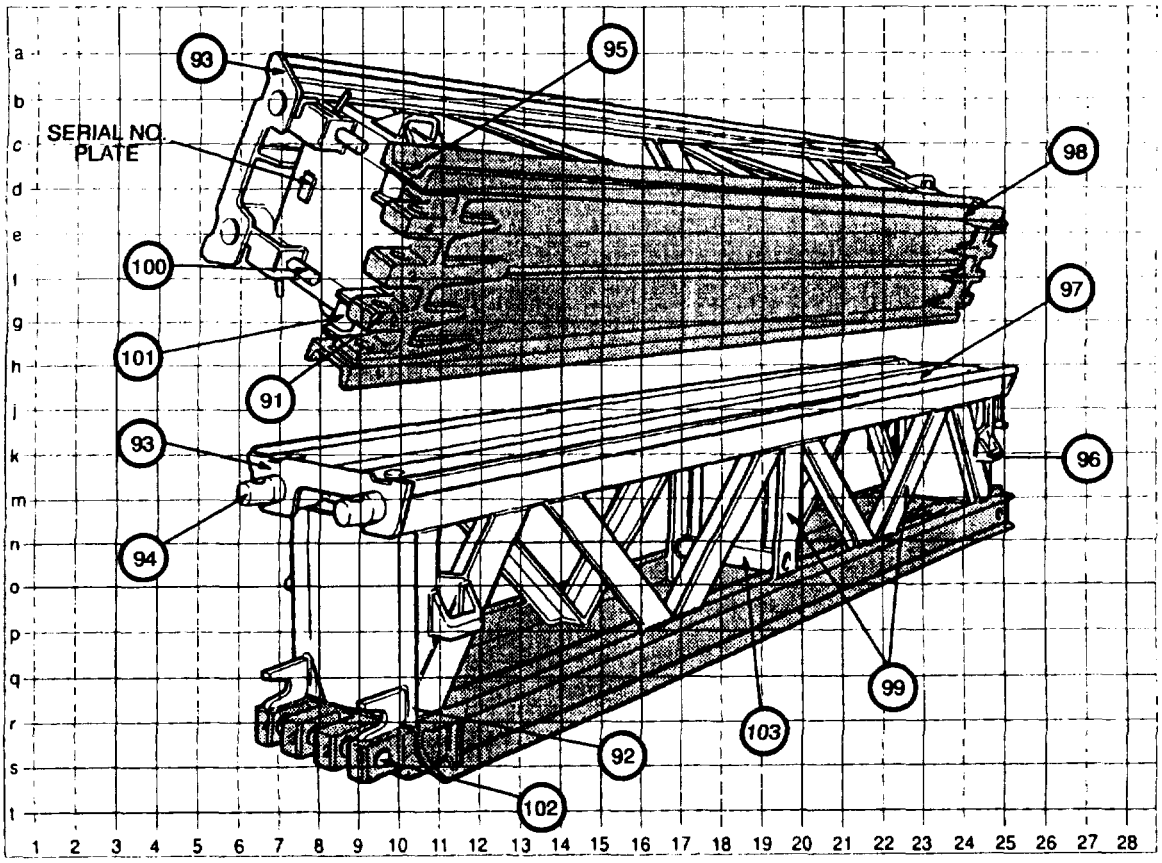
Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
			c. Examine shoot bolt holes (88) for wear and corrosion.	Worn and corroded shoot bolt holes.



23	See Table 2-2	Push Bar Cross Girder	a. Check for damage, distortion of frame (89).	Frame is damaged and distorted.
			b. Check welded joints for cracks and breaks.	Cracks and breaks in welded joints.
			c. Examine holes (90) for wear and corrosion.	Wom and corroded holes.

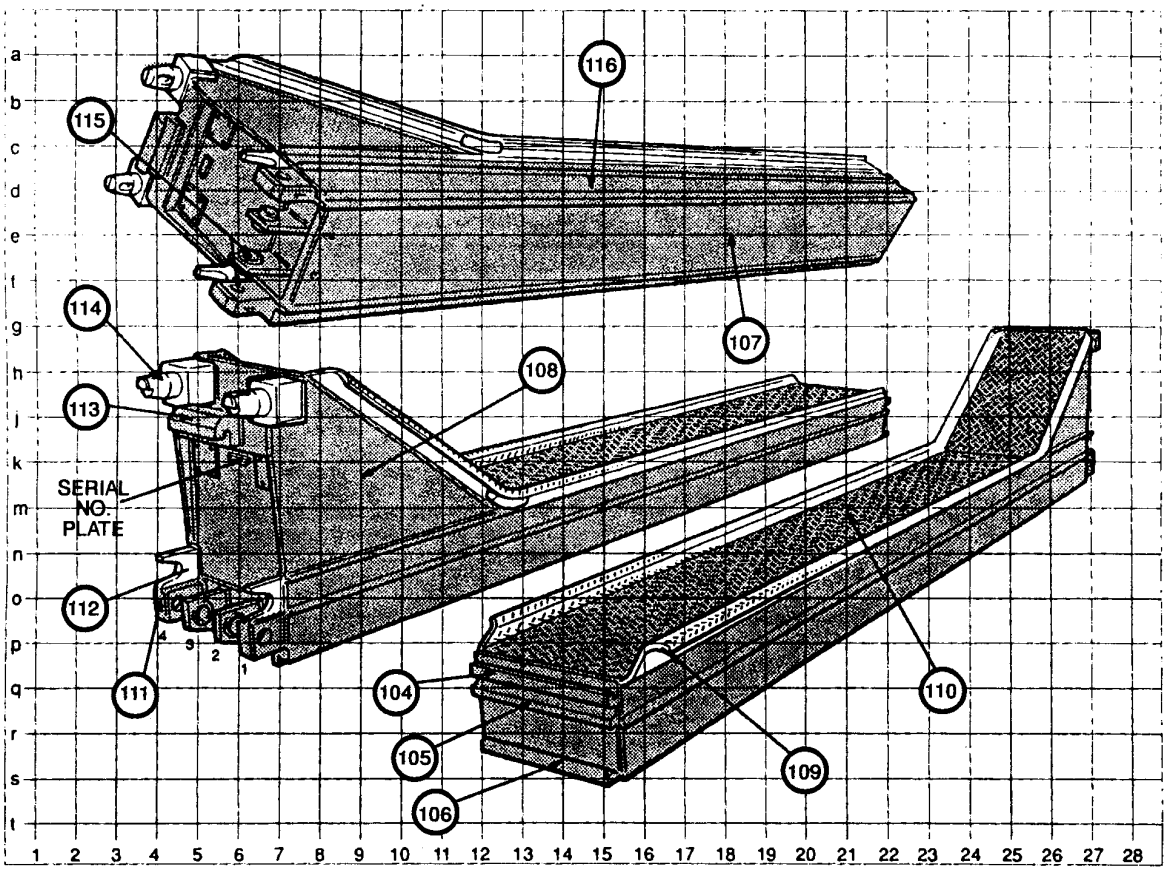
Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
				
24	See Table 2-2	Jack 15 Ton	a. Inspect for leaks and cracks.	Evidence of leaks and cracks.
			b. Examine swivel head for damage.	Damaged swivel head.
			c. Ensure filler cap/dipstick and release valve are screwed in.	Filler cap/dipstick and release valve are not screwed in.
			d. Check that handle fits into jacking quadrant.	Handle does not fit into jacking quadrant.
			e. Check oil level and operation of jack.	Oil level is low and jack does not operate.
25	See Table 2-2	Launching Nose Heavy	a. Check for damage to jaw blocks (91), guide (92), compression faces (93), dowel pins (94), resilient mount, brackets and pins (95).	Damaged jaw blocks, guide, compression faces, dowel pins, resilient mount, brackets and pins.
			b. Check for security of carrying bar brackets (96).	Carrying bar brackets are not secure.

Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
			c. Inspect the area around all welds for corrosion and cracking, distortion and damage and also top (97) and bottom chords (98), vertical and diagonal bracing members (99).	Corrosion, cracks, distortion and damage around all welds, top and bottom chords, vertical and diagonal bracing members.
			d. Inspect shoot bolts (100) for security and correct operation.	Not secure and uncorrect operation of shoot bolts.
			e. Check for damage to protective paint film.	
			f. Inspect resilient mounts (101) for freedom of movement.	
			g. Check resilient mount cotter pins for security.	
			h. Inspect pin holes (102) and anchorage tube (103) for corrosion and wear.	Pin holes and anchorage tube corroded and wom.



Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
26	See Table 2-2	Light Launching Nose (Front)	a. Check for damage to top rail (104), center lug (105) and bottom rail (106). b. Inspect the area around all welds for corrosion and cracking, distortion and damage and also the bottom chord (107) and side plates (108). c. Check for damage/distortion to extrusion (109). d. Check for damage to protective paint and anti slip surface (110).	Damaged top rail, center lug and bottom rail. Corrosion, cracking, distortion and damage around all welds, bottom chord and side plates. Extrusion damaged/distorted.
27	See Table 2-2	Light Launching Nose (Rear)	a. Check a. to d. above.	If any of the above occur.

Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
			b. Check for damage to jaws (111), guide slots (112), center hook (113), dowels (114) and pin holes (115).	Jaws, guide slots center hook dowels and pin holes damaged.
			c. Check for distortion of side plates	Side plates distorted. (116).



28	See Table 2-2	Landing Roller Pedestal Mk 1	a. Check for damage, distortion to frame and lugs (117), and security of bolt on items.	Frame and lugs damged or distorted. Bolts not secure.
			b. Check that jackseat (118) moves freely and bolts and pins (119) are secure.	Jackseat is loose. Bolts and pins are not secure.
			c. Examine saddle (120) for damage and freedom of movement.	Damage to saddle and loose.

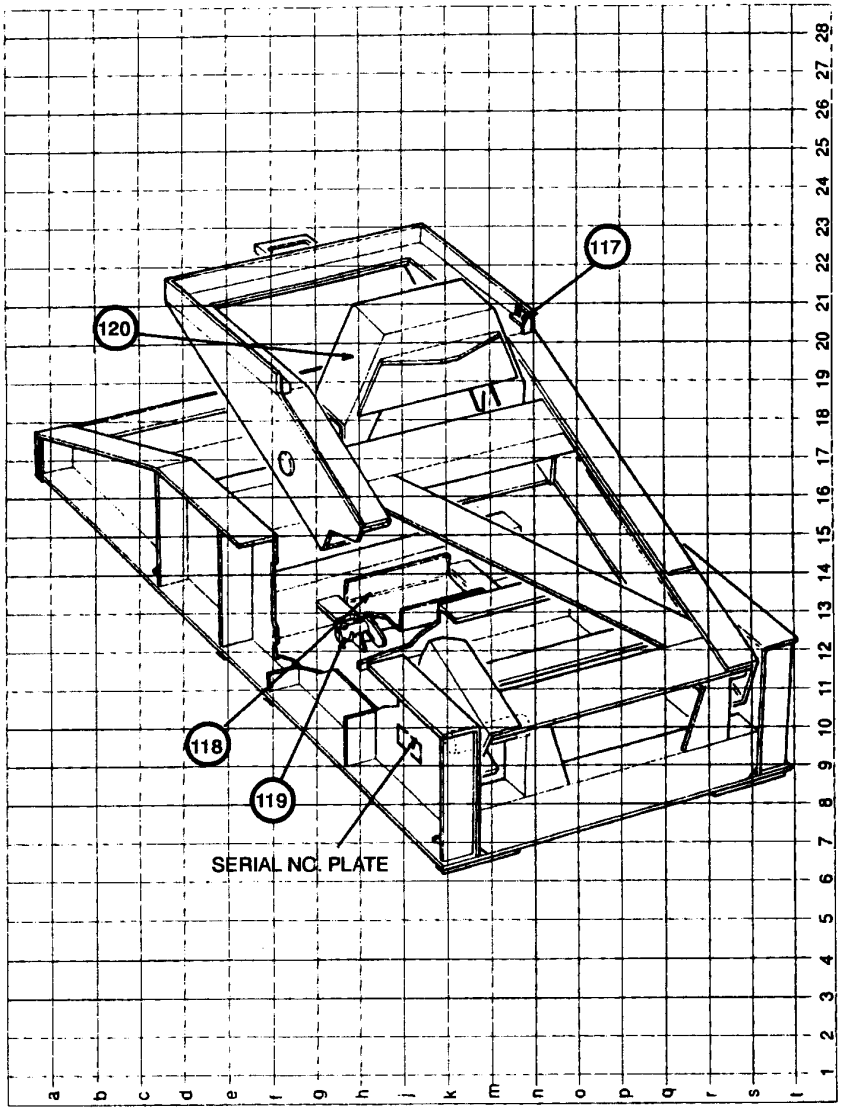
Item No.	Interval	Location Checked Or Serviced	Procedure	Not Fully Mission Capable If:
				
29	See Table 2-2	Building Pedestal	a. Check frame for damage, distortion. b. Examine area around all welds for corrosion and cracking, distortion and damage.	Frame damaged or dis sorted. Corrosion, cracking, distorsion and damage around all welds.

TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
30	See Table 2-2	Anchorage Pin Assembly	a. Examine pin for excessive wear or scoring.	Evidence of excessive wear or scoring on pins.
			b. Examine lug for weld damage and pin holes for wear and corrosion. corrosion in pin holes.	Evidence of weld-damage on lug and wear and
			c. Check security of retaining pin and dip.	Retaining pin and dip are not secure.
31	See Table 2-2	Launching Nose Pin	a. Examine pin for excessive wear and scoring.	Evidence of excessive wear and scoring on pin.
			b. Check for damage and distortion. launching nose pin.	Damage and distortion of
32	See Table 2-2	Double Story Baseplate	a. Examine area around all welds for corrosion, cracking, distortion and damage.	Evidence of corrosion, cracks, distortion and damage around all welds.
			b. Check ball (121), nose pin holes (122) and levelling screw hole blocks (123) for security, wear and corrosion.	Ball, nose pin holes and levelling screw hole blocks are not secure; show wear and corrosion.
			c. Check frame (124) for distortion.	Frame is distorted.

TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

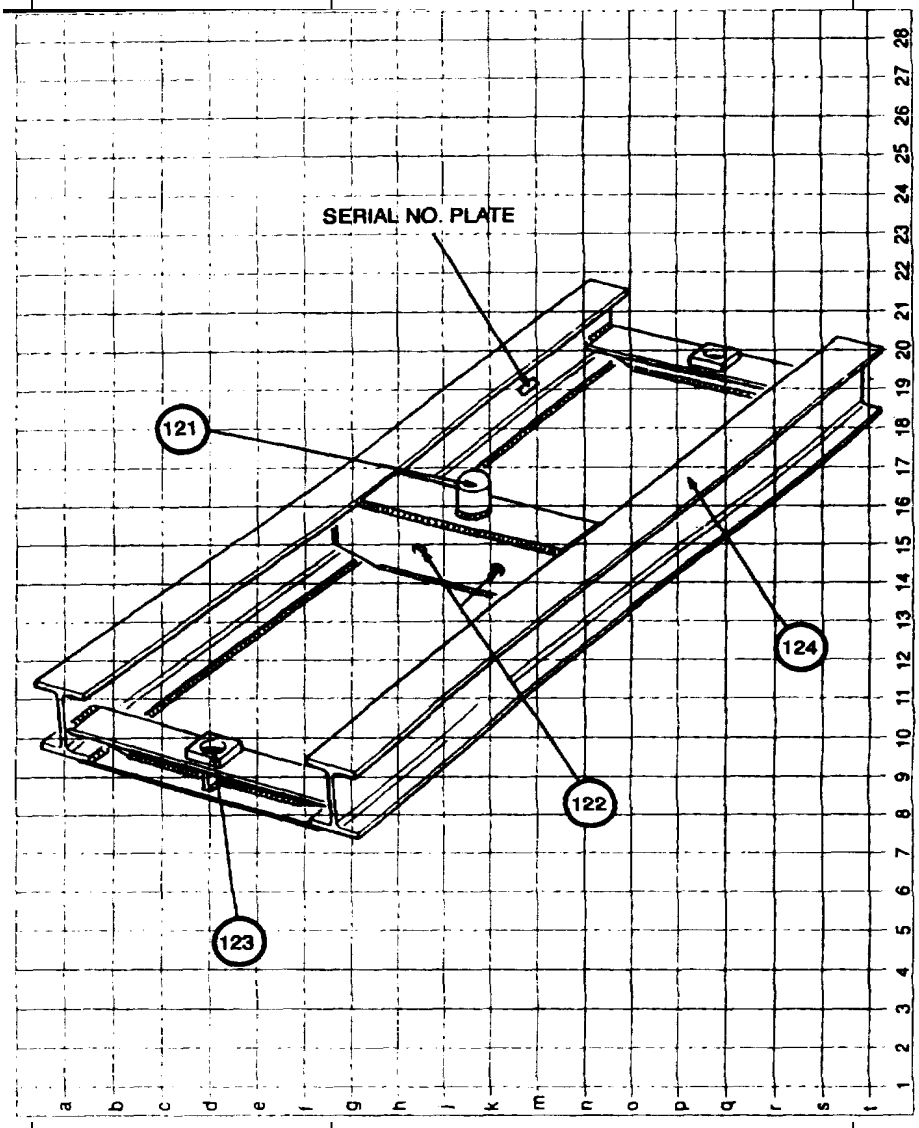
Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
				
33	See Table 2-2	Single Story Baseplate	a. Examine area around all welds for corrosion, cracking, distortion and damage.	Evidence corrosion, cracks, distortion and damage around all welds.
			b. Check security for lug (125).	Lug is not secure.
			c. Check nose pin holes (126) for wear and corrosion.	Wear and corrosion on nose pin holes.
			d. Check frame (127) for distortion.	Frame distorted.

TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

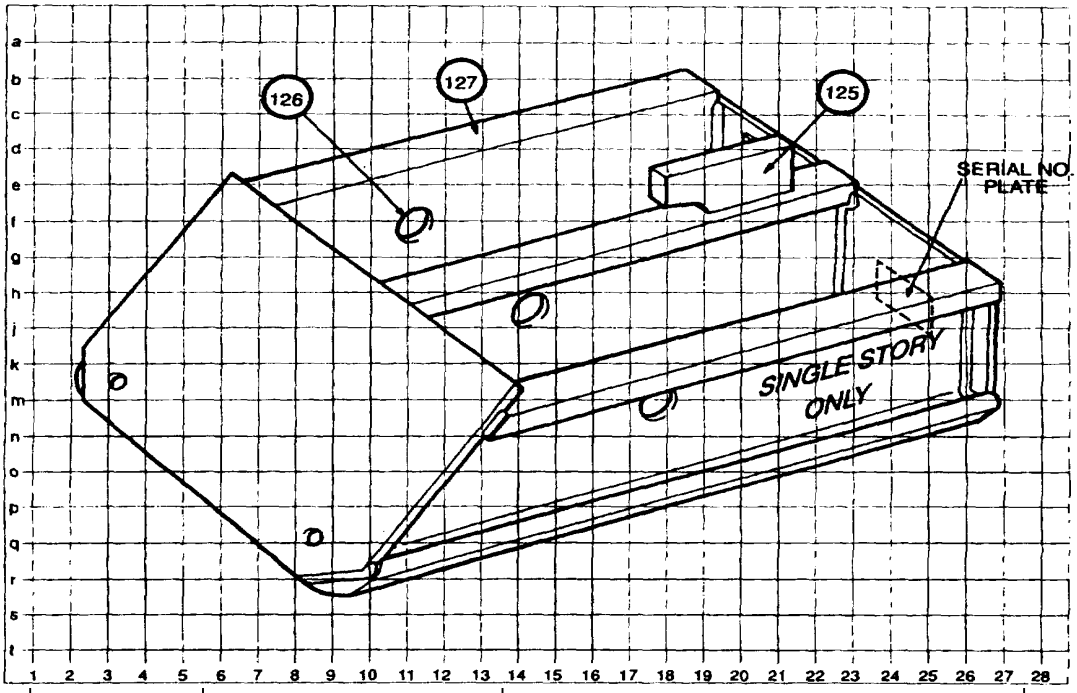
Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
				
34	See Table 2-2	Jack Post	a. Examine wedge (128) for damage and distortion and steel pin and holes for wear, elongation and corrosion.	Wedge damaged or distorted. Steel pin and holes. Show wear, elongation and corrosion.
			b. Examine jack hood (129) for damage and distortion and steel pin and holes for wear, distortion and corrosion . torted and corrosion.	Jack hood damaged or distorted. Steel pin and holes show wear, dis-
			c. Examine nose pin hole (130) for wear and corrosion.	Nose pin hole shows wear and corrosion.
			d. Check security of stop bolt (131) and cotter pins on steel pins.	
			e. Examine area around all welds for corrosion, cracking, distortion and damage.	Evidence of corrosion, cracks, distortion and damage around all welds.
			f. Check all ratchet slots (132) for wear and damage.	Ratchet slots show wear and damage.

TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
35	See Table 2-2	Launching Nose Cross Girder Post	a. Check welds on top lug (133), center lug (134), bottom lug (135) and stop plate (136) for cracks and breaks. b. Check post for damage and distortion. c. Examine all holes (137) for wear and corrosion.	Top lug, center lug, bottom lug, and stop plate show cracks and breaks. Post is damaged and distorted. Holes are worn and corroded.

TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
36	See Table 2-2	Landing Roller Assembly	a. Check security of cotter pins (138) in roller mounting pins and in bearing carrier mounting pin (139). ing pin. b. Check roller assemblies (140) for freedom of movement, damage and wear and anti-rotation spring pins (141) for security. c. Check carrier assembly (142) for freedom of movement and damage. d. Examine base (143) for damage and distortion.	Cotter pins not secure in roller mounting pins and in bearing carrier mount- Roller assemblies not free to move, damaged or wom. Anti-rotation spring pins not secure. Carrier assembly not free to move or damaged. Base is damaged and distorted.

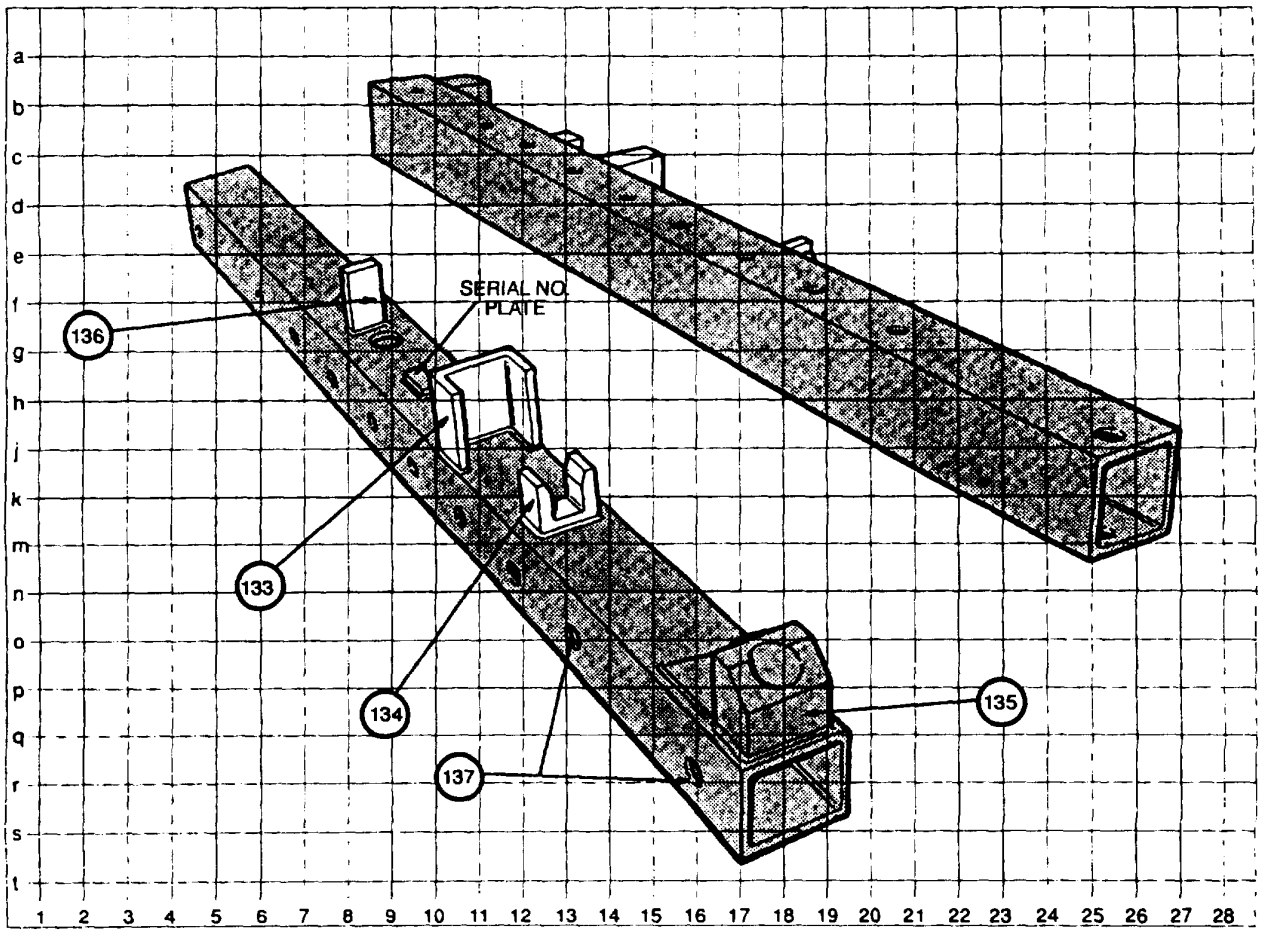


TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
37	See Table 2-2	Launching Nose Roller	a. Examine area around all welds for corrosion, cracking, distortion and damage.	Evidence of corrosion, cracks, distortion and damage around all welds.
			b. Examine anchorage holes (144) and pin jaws (145) forwear and corrosion and also ramp shelf hooks (146). shelf hooks.	Evidence of wear and corrosion in anchorage holes, pin jaws and ramp
			c. Check rollers (147) for freedom of movement, and security of cotter pins (148).	Rollers are not free to move and cotter pins are not secure.
			d. Check frame (149) for damage and distortion.	Frame damaged and distorted.

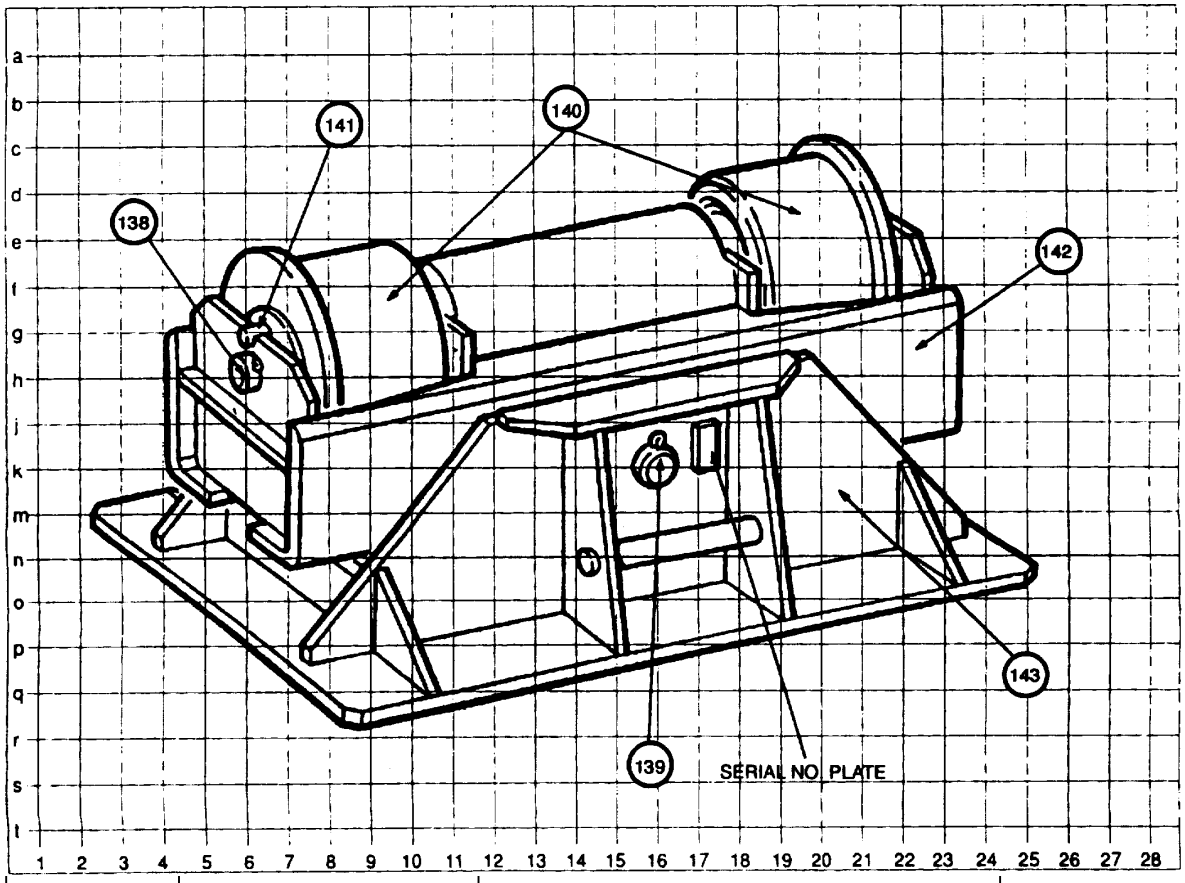


TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

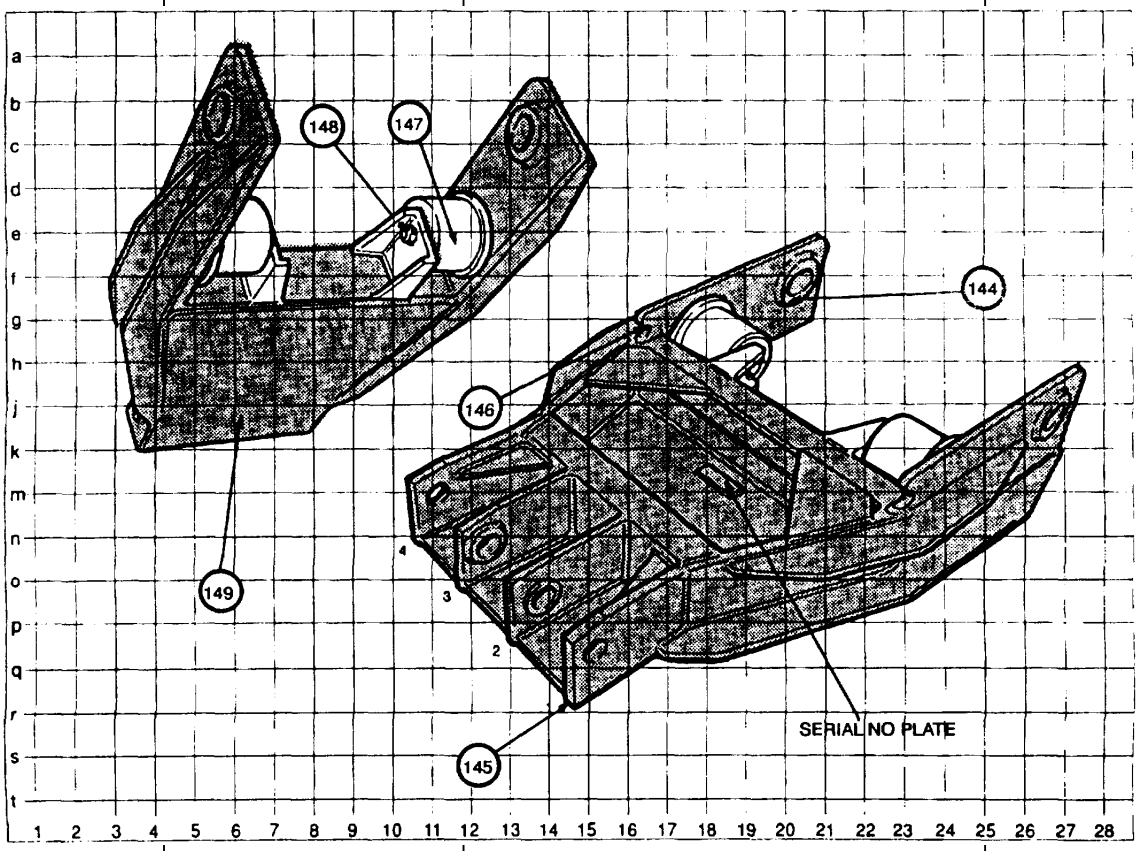
Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
				
38	See Table 2-2	Jack Seat	Examine area around all welds for corrosion, cracking, distortion and damage. welds.	Evidence of corrosion, cracks, distortion and damage around all
39	See Table 2-2	Lifting Sling chafing on cables.	a. Examine cables for wear, chafing. b. Examine hooks for security and damage. c. Examine eye for cracks and breaks. breaks in eye.	Evidence of wear and Evidence of hooks not being secure and damaged. Evidence of cracks and

TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
40	See Table 2-2	Adjustable Support Assembly	a. Examine area around all welds for damage.	Evidence of corrosion, cracks, distortion and
			corrosion, cracking, distortion and damage around all welds.	
			b. Examine frame and hooks (150) for damage and distortion.	Evidence of damage and distortion in frame and hooks.
			c. Examine shoot bolts (151) for security and freedom of operation.	Evidence of shoot bolts not being secure and free to operate.
			d. Examine levelling screws (152) for wear and damage.	Evidence of wear and damage in leveling screws.
			e. Check the security of support pins (153) and also for heavy scoring. Examine chains for corrosion and security.	Support pins are not secure and show signs of heavy scoi;ilg. Chains are corroded and not secure.
			f. Examine support pin holes (154) for wear and corrosion.	Evidence support pin holes are worn and corroded.

TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

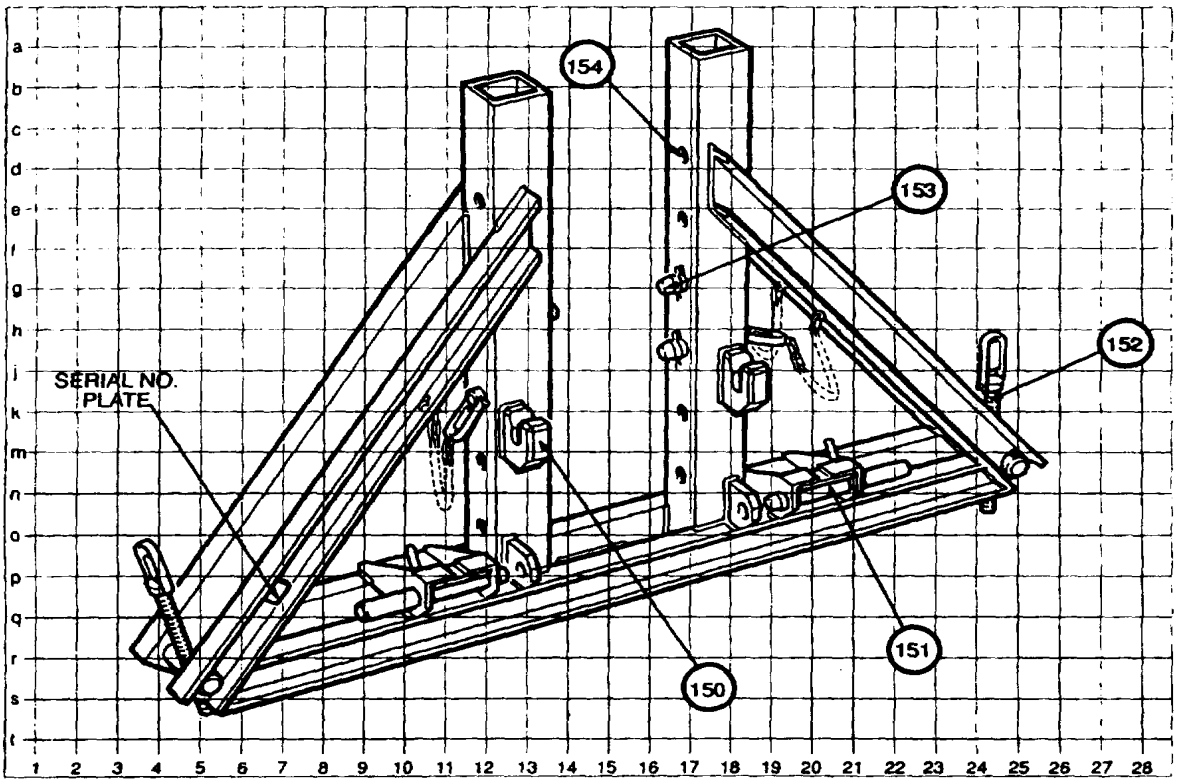
Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
				
41	See Table 2-2	Fixed Support	a. Examine area around all welds for corrosion, cracking, distortion and damage.	Evidence of corrosion, cracks, distortion and damage around all welds.
			b. Examine pivoting head for freedom of movement.	Pivoting head not free to move.
			c. Check security of mounting pin and cotter pins.	Mounting pin and cotter pins are not secure.
42	See Table 2-2	Jack Support	a. Examine area around all welds for corrosion, cracking, distortion and damage.	Evidence of corrosion, cracks, distortion and damage around all welds.
			b. Check nose pin holes for wear and corrosion.	Nose pin holes are wom and corroded.
43	See Table 2-2	Longitudinal Girder	a. Examine area around all welds for corrosion, cracking, distortion and damage.	Evidence of corrosion, cracks, distortion and damage around all welds.
			b. Check frame (155) for alignment and distortion.	Frame is out of alignment and distorted.

TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

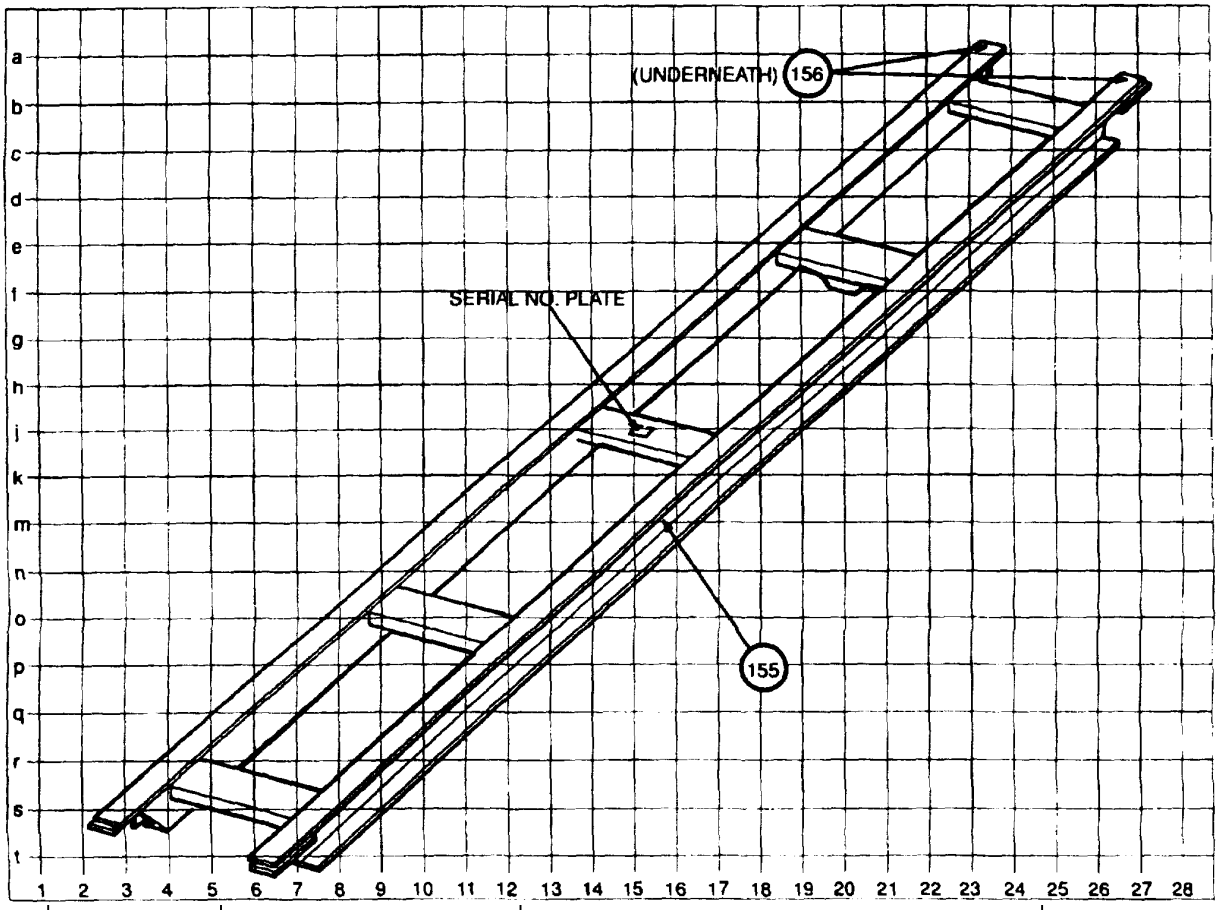
Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
			c. Check security of dowels (156) at both ends.	Dowels are not secure at both ends.
				
c.	Link Reinforcement Set.			
44	See Table 2-2	Long Reinforcing Link Short Reinforcing Link	a. Examine all welds for cracks and breaks, especially where extrusion is welding to jaws (157).	Evidence of corrosion, cracks, distortion and damage around all welds.
			b. Check overall for damage and distortion.	Overall damage and distortion.
			c. Examine pin jaws (158) for damage and pin holes (159) for wear. holes.	Evidence of damage to pin jaws and wear of pin

TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

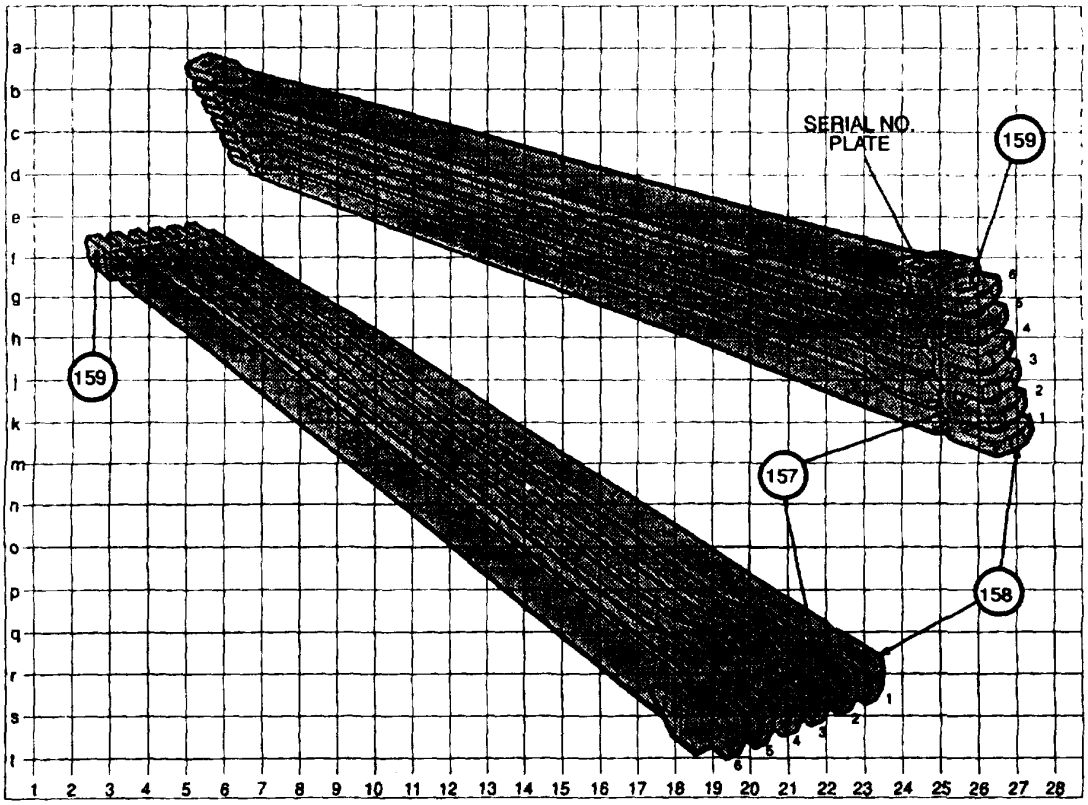
Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
				
45	See Table 2-2	Anchor Assembly	a. Examine all welds for cracks and breaks, especially where extrusion is welded to jaws (160). sion is welded to jaws.	Evidence of cracks and breaks around all welds especially where extru-
			b. Examine short anchor link (161) and long anchor link (162) for damage and distortion.	Evidence of damage and distortion to short and long anchor links.
			c. Check links for freedom of movement about junction block (163).	Links are not free to move about junction block.
			d. Check junction block for security and pin hole (164), for undue wear and damage. aged.	Junction block not secure and pin hole shows signs of being wom and dam-
			e. Check fork end anchors (165) for security, freedom of movement and damage.	Fork end anchors are not secure, free to move and damaged.

TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
			f. Check bracing pins in fork end anchor and retainer clips for security.	Bracing pins in fork end anchor and retainer dips are not secure.
			g. Check bonded bearings (166) for security and any wear/damage.	Bonded bearings are not secure and show any signs of being wornm/damaged.
			h. Check jaw block and pin holes(167) for wear and distortion.	Jaw bock and pin holes are worn and distorted.
46	See Table 2-2	Push Bar (Long)	a. Examine area around all welds for corrosion, cracking, distortion and damage.	Evidence of corrosion, cracks, distortion and damage around all welds.
			b. Check all holes for wear and corrosion.	Holes are worn and corroded.
			c. Check the swivel end for freedom of movement.	Swivel end is not free to move.

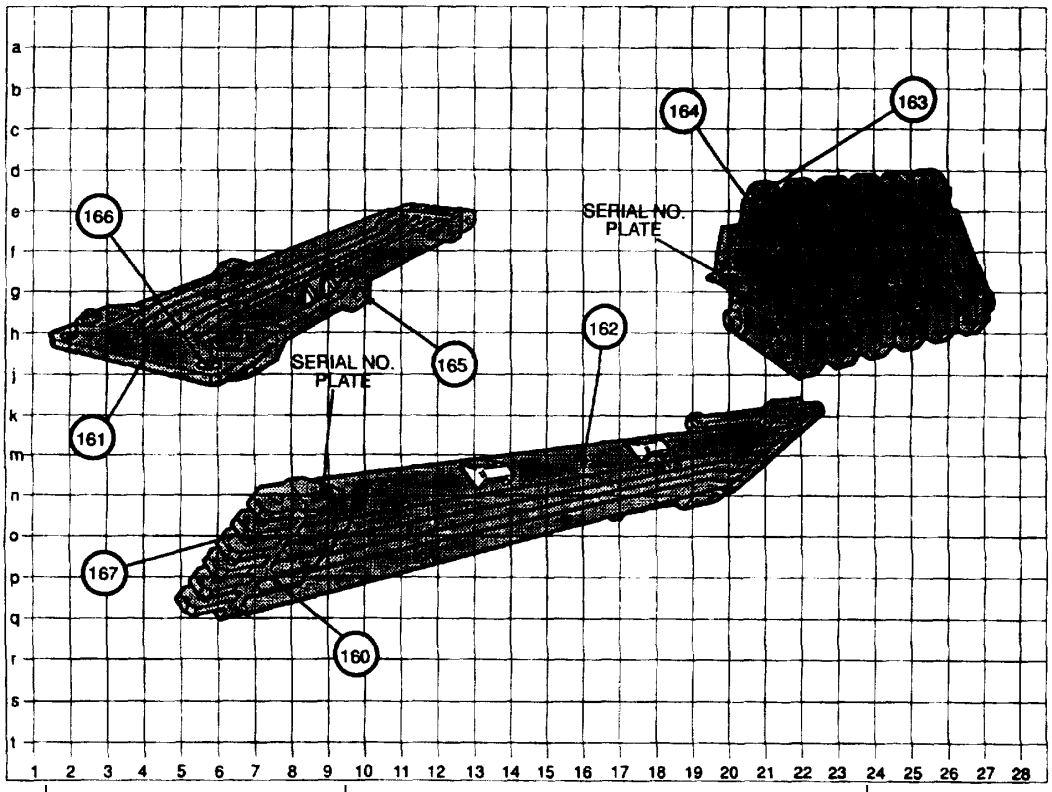


TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
			d. Check that stencil Other Side Up" is legible on bottom of bar.	
47	See Table 2-2	Footwalk Bearer	a. Examine area around all welds for corrosion, cracking, distortion and damage.	Evidence of corrosion, cracks, distortion and damage around all welds.
			b. Check bearing pad (168) for damage and distortion.	Bearing pad is damaged and distorted.
			c. Check stub pin bracket (169) and footwalk stops (170) for security.	Stub pin bracket and footwalk stops are not secure.
			d. Check post hole (171) for wear and corrosion.	
48	See Table 2-2	Jacking Bracket	a. Examine area around all welds for corrosion, cracking, distortion and damage.	Evidence of corrosion, cracks, distortion and damage around all welds.
			b. Check bracket (172) and link (173) for damage and distortion.	Bracket and link is damaged and distorted.

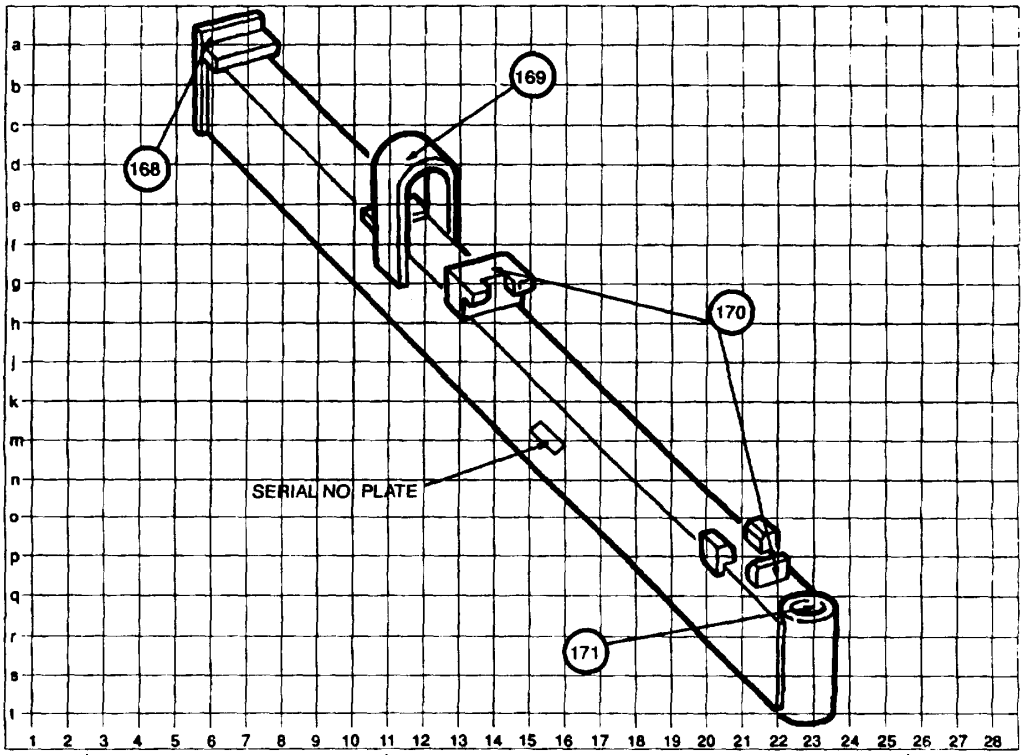


TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

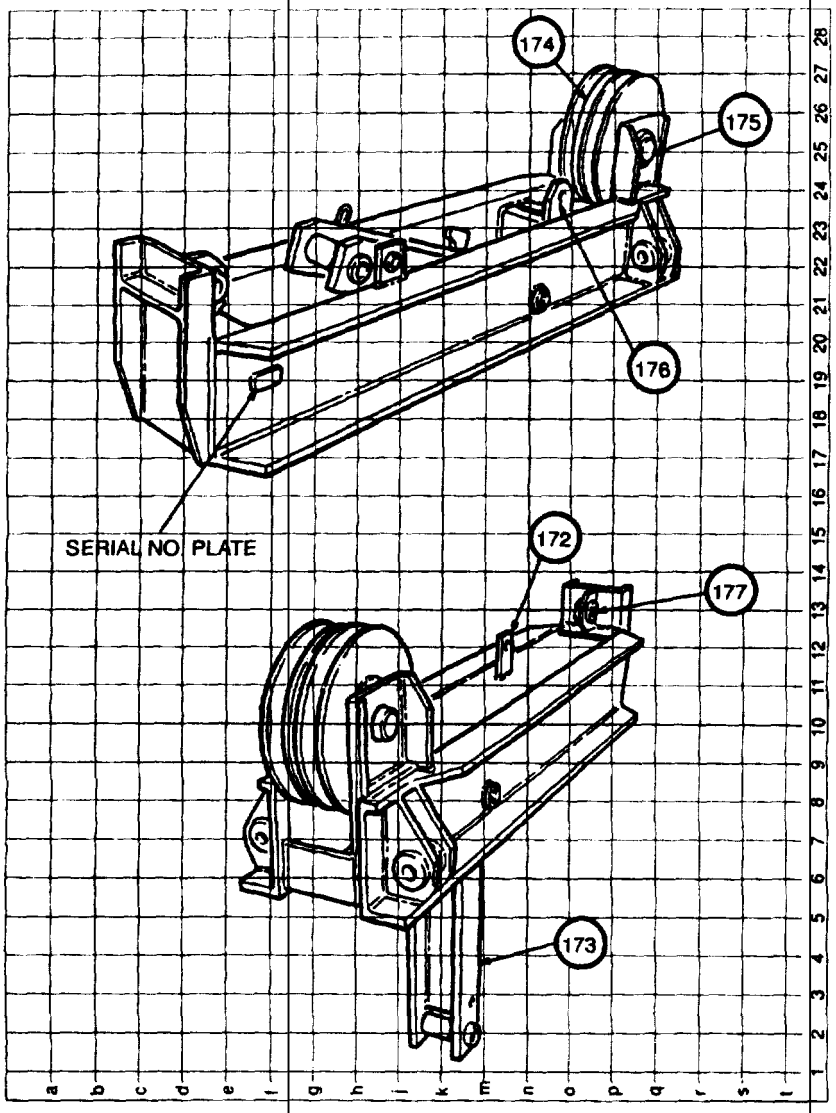
Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
			c. Check pulleys (174) for freedom of movement and mounting pin (175) for security.	Pulleys are not free to move and mounting pin is not secure.
			d. Check cable lug (176) and puller lug (177) for damage and security and all holes for wear and corrosion.	Cable and puller lugs are damaged and not secure. Holes show signs of being worn and corroded.
				
49	See Table 2-2	Capsill	a. Examine area around all welds for corrosion, cracking, distortion and damage.	Evidence of corosion, cracks, distortion and damage around all welds.

TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

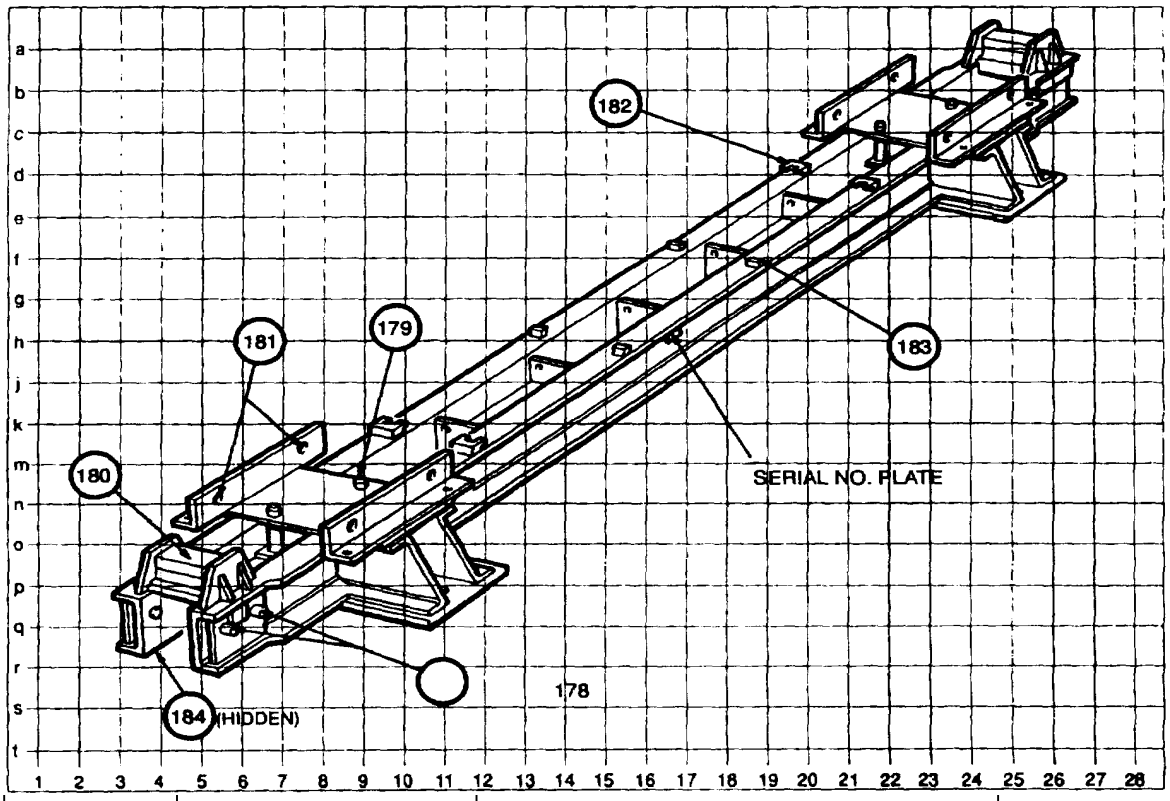
Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
			b. Check fixed pins (178) and (179) for damage and security.	Fixed pins damaged and not secure.
			c. Check jack hood (180) for damage and distortion.	Jack hood damaged and distorted.
			d. Check nose pin holes (181) for wear and corrosion.	Nose pin holes are worn and corroded.
			e. Check guides (182) and blocks (183) and (184) for security, wear and distortion.	Guides and blocks are not secure, wom and distorted.
				
50	See Table 2-2	Footwalk	a. Examine for damage or distortion.	Footwalk damaged or distorted.
			b. Examine carrying handle holes (185) for wear and corrosion.	Carrying handle holes are worn and corroded.

TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
51	See Table 2-2	Jack 20 Ton	a. Inspect for leaks and cracks.	Evidence of leaks and cracks.
			b. Examine swivel head for damage.	Swivel head damaged.
			c. Ensure filler cap/dipstick and release valve are screwed in.	Filler cap/dipstck and release valve are not tight.
			d. Check that handle fits into jacking quadrant.	Handle does not fit into jacking quadrant.
			e. Check oil level and operation of jack. does not operate properly.	Oil level is low and jack
52	See Table 2-2	Davit Post Assembly	a. Examine area around all welds for corrosion, cracking, distortion and damage.	Evidence of corrosion, cracks, distortion and damage around all welds.
			b. Check pulleys (186) for damage and freedom of movement.	Pulleys are damaged and not free to move.

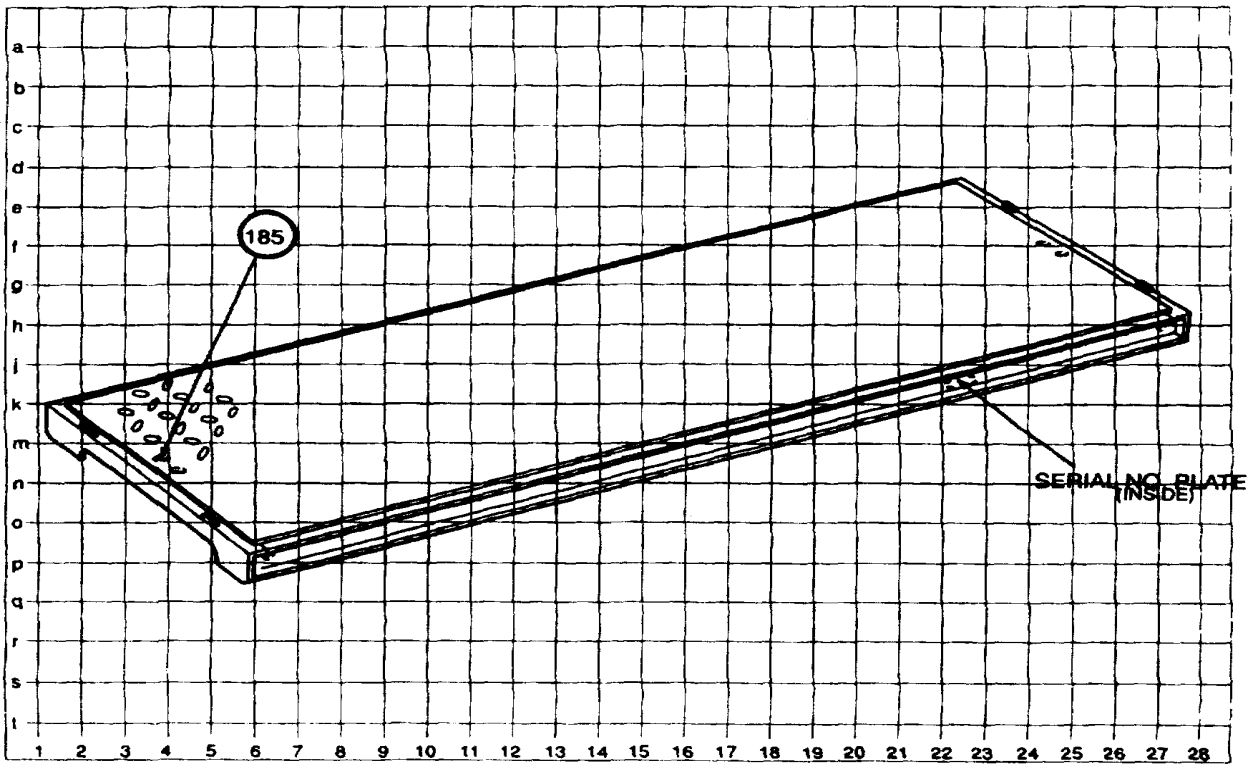


TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
			c. Check levelling screws (187) for damage and freedom of movement. move.	Levelling screws are damaged and not free to
			d. Check pins (188) for wear and security.	Pins are worn and not secure.
			e. Examine safety chain links (189) for damage or wear.	Safety chain links are damaged or wom.
			f. Check all holes for wear and corrosion.	Holes are worn and corroded.

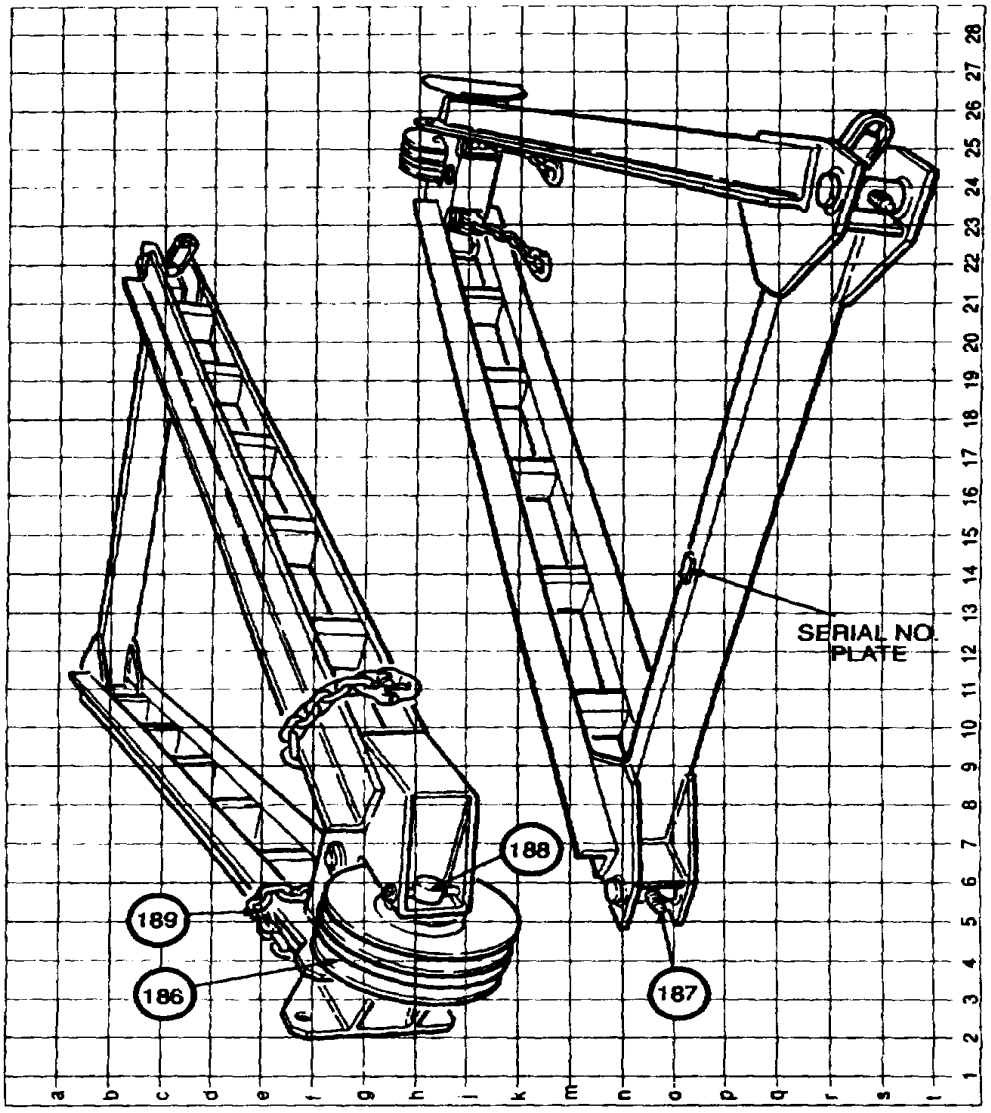


TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
53	See Table 2-2	Cable Puller or distortion.	a. Examine puller assembly for damage	Puller assembly is damaged or distorted.
			b. Check cable for wear, fraying and kinking, and ensure there are no smooth, bar like areas exceeding 6 in (152mm) in length.	Cable is worn, frayed, kinked and has smooth bar like areas exceeding 6 inches in length.
			c. Check that all parts are well lubricated.	All parts are not well lubricarted.
			d. Check that all levers operate freely. freely.	Levers do not operate
			e. Check jaw wear by putting a mark on the case opposite rope release lever without any rope in the machine. Then insert rope, dose lever and place a second mark on the case. The distance between these two marks should never be less than 1 in (25 mm).	Jaw wear exceeds 1 inch.
54	See Table 2-2	Footwalk Post	a. Check that post is free from damage or distortion.	Post is damaged or distorted.
			b. Check that hooks are secure and undamaged.	Hooks are not secure and damaged.
55	See Table 2-2	Rocking Roller Assembly	a. Examine area around all welds for corrosion, cracking, distortion and damage.	Evidence of corrosion, cracks, distortion and damage around all welds.
			b. Examine rollers (190) for freedom of movement.	Rollers are not free to move.
			c. Check roller shafts(191)for damage. aged.	Roller shafts are dam-
			d. Check security of lock nuts (192) on shaft stop arm.	Lock nuts are not secure on shaft stop arm.
			e. Check guide holes (193) and nose pin holes (194) for wear and corrosion.	Guide and nose pin holes are worn and corroded.
			f. Check condition of rubber blocks (195).	Rubber blocks are not in good condition.
			g. Check bearing plates (196) for freedom of movement and security.	Bearing plates are not free to move and unsecure.

TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
			h. Check operation of plunger assemblies (197) securing bearing plates. securing bearing plates.	Plunger assemblies are not operating properly in
			i. Examine bearing pads (198) for damage and wear.	Bearing pads are damaged and worn.
			j. With bearing plates fully in, measure gap between top of rollers in up position and bearing plate. Gap should be 0.075 m (1.9 mm) minimum.	Gap between bearing plates and top of rollers is less than the 0.075 m minimum.

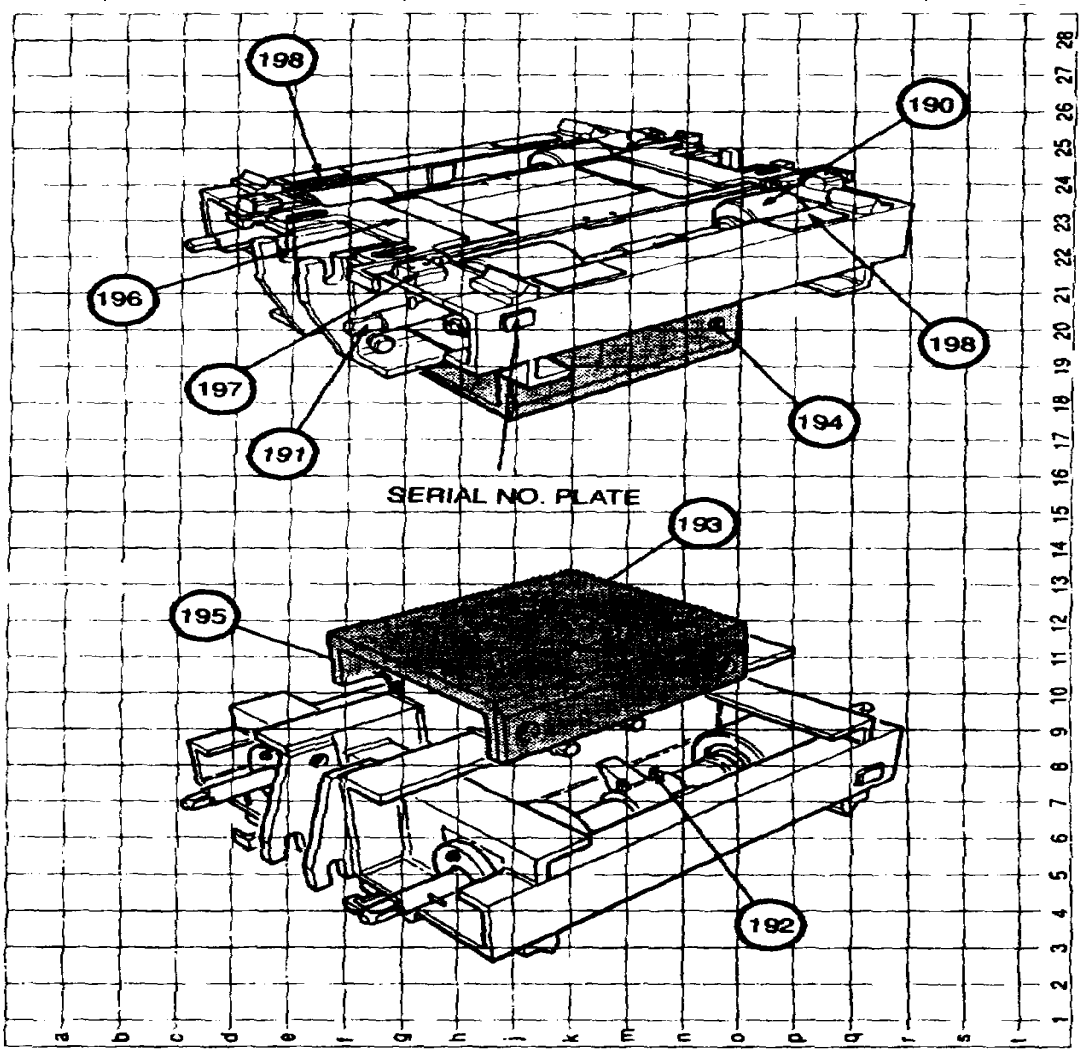


TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
56	See Table 2-2	Rope Guard	a. Examine rope for wear and fraying.	Rope is worn and frayed.
			b. Check security of, and damage to hooks.	Hooks are not secure and damaged.
57	See Table 2-2	Anti-Flutter Tackle	a. Examine rope for wear and fraying, and ensure there are no knots.	Rope is worn, frayed and has knots.
			b. Examine hook for cracking and security.	Hook is cracked and not secure.
			c. Examine block for cracking and security.	Block is cracked and not secure.
			d. Examine toggle bar and spring for damage and distortion.	Toggle bar and spring is damaged and distorted.
58	See Table 2-2	Light Tackle	a. Examine rope for wearing and fraying.	Rope is worn and frayed.
			b. Examinehooksand plate for cracking and security. cure.	Hooks and plate has cracks and are not se-
			c. With exception of knots after hook and plate, there shall be no other knots.	Knots appear after hook and plate.
			d. Examine block and pulley for freedom free to move, damaged security.	Block and pulley are not of movement, damage and and unsecure.
			e. Examine toggle bar and spring for damage and distortion.	Toggle bar and spring is damaged and distorted.
	If sliding block is reported as sticking,		**NOTE** **it must be removed to inspect bearing pads and strips.**	
59	See Table 2-2	Post Tensioning Assembly	a. Examine area around all welds for corrosion, cracking, distortion and damage.	Evidence of corrosion, cracks, distortion and damage around all welds.
			b. Check stub pins (199) for damage and carrying bar brackets (200) for damage and security.	Stub pins are damaged. Carrying bar brackets are damaged and not secure.
			c. Inspect puller bracket and mounting holes (201) for wear and corrosion.	Puller bracket and mounting holes are worn and corroded.

TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
			d. Check operation and security of lever assembly (202) underneath tackle block bracket and also security of lever rubber block. block is not secure.	Lever assembly underneath acide block bracket does not operate and is not secure. Lever rubber
			e. Examine tackled block for damage and distortion.	Tackle block is damaged and distorted.
			f. Check operation and security of catch assembly (203) and rubber block (204).	Catch assembly and rubber block does not operate and is not secure.
			g. Check guide (205) for damage and wear.	Guide is damaged and worn.
			h. Check that sliding block (206) travels freely along body.	Sliding block does not travel freely along body.
			i. Check bearing strips (207) and (208) are not wornor damaged.	Bearings strips are worn and damaged.
			j. Examine Betalights (209) (if fitted) for operation, damage and security. and not secure.	Betalighs (if fitted) do not operate, are damaged
			k. Check sliding block lugs (210) for damage and wear.	Sliding block lugs are damaged and worn.
			l. Examine reinforcement post pin jaws and holes (211) for wear, cracks and damage.	Reinforcement post pin jaws and holes are worn, cracked and damaged.
			m. Check that drain hole (212) is dear of obstruction and that lugs (213) are not damaged or distorted.	Drain hole is obstructed and lugs are damaged or distorted.
			n. Inspect junction block, pin holes (214) for undue wear and damage, and security of bolts (215). not secure.	Junction block, pin holes show signs of undue wear and damage. Bolts are

TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :

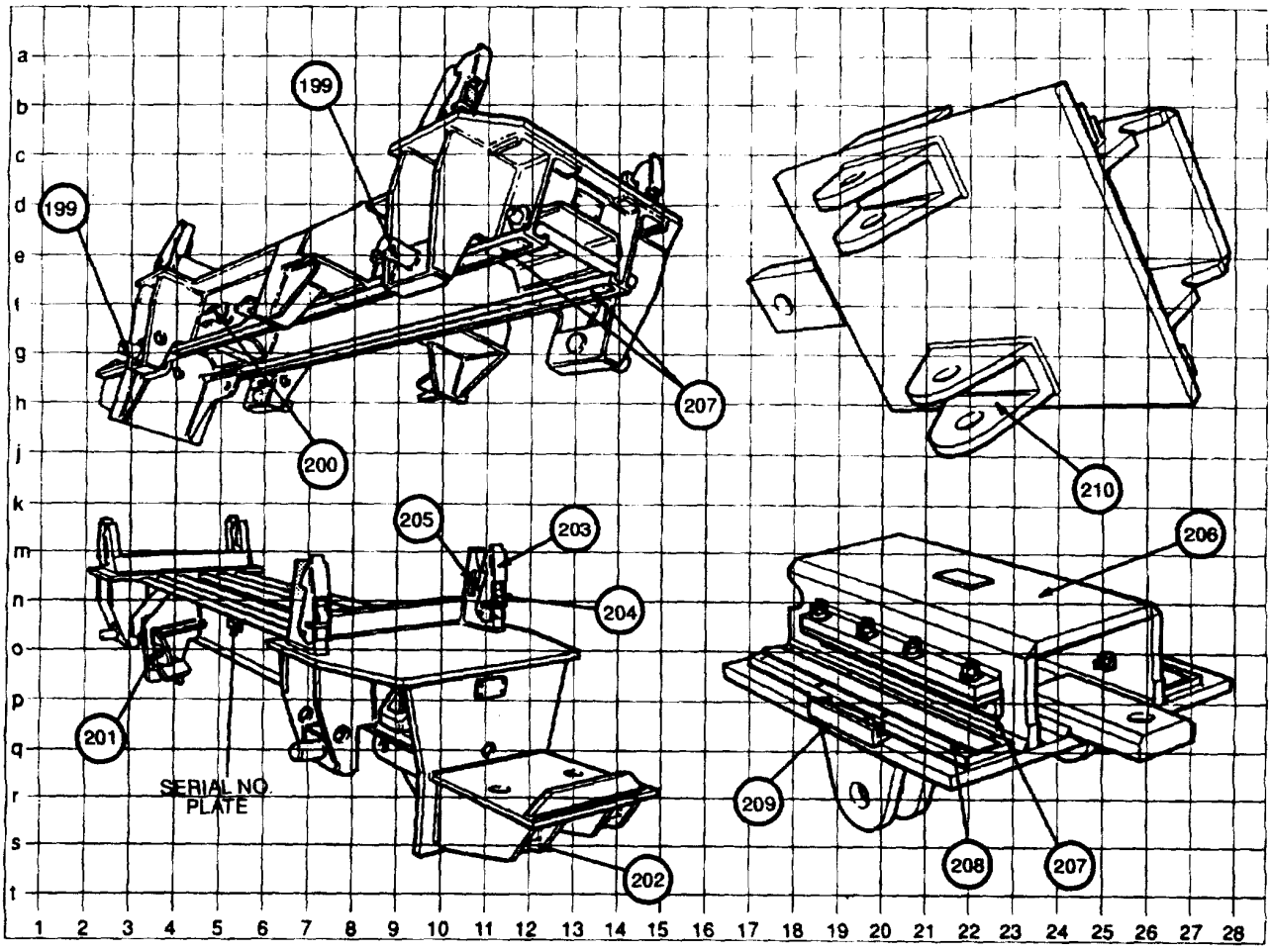


TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

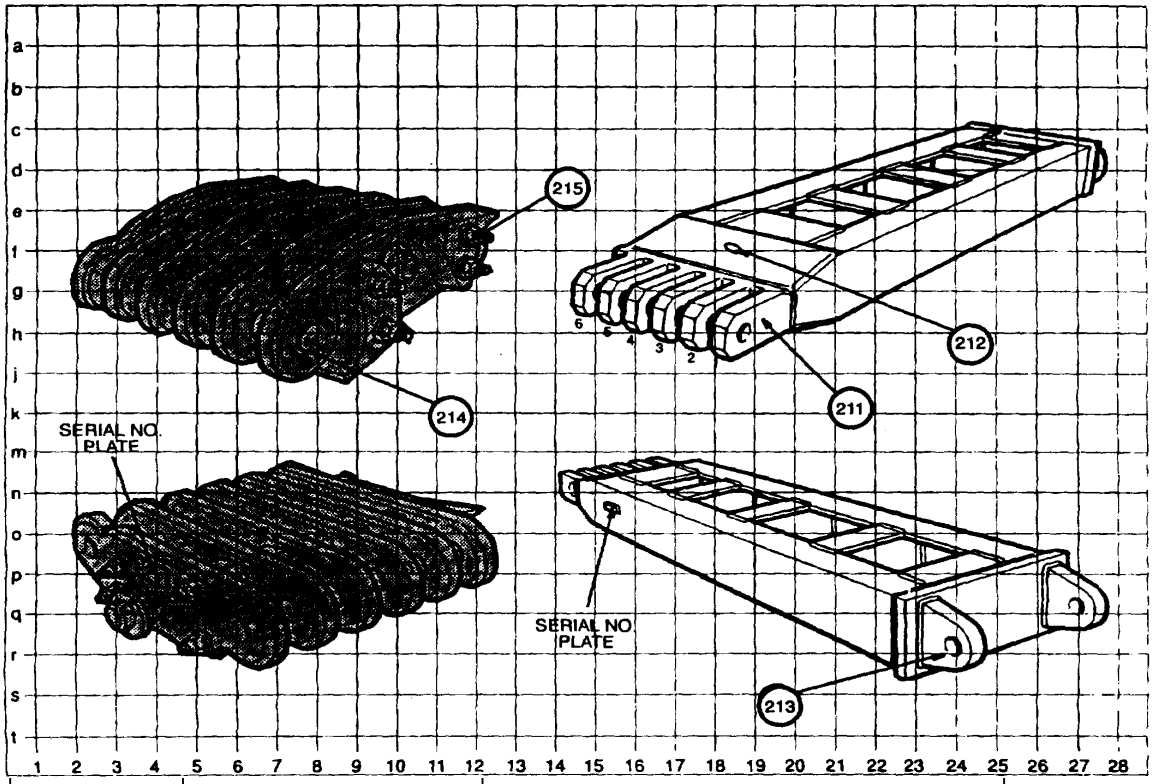
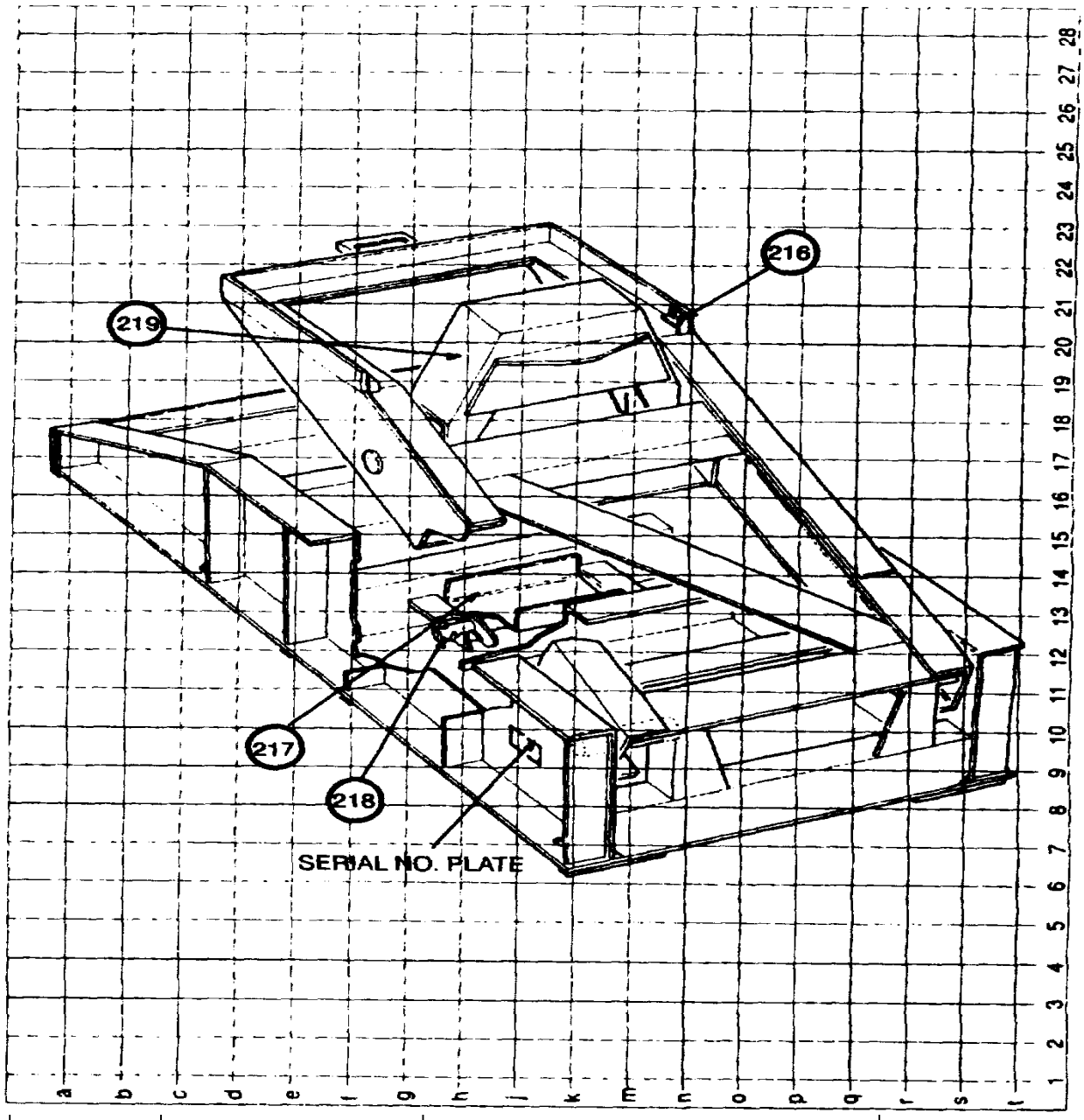
Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
				
60	See Table 2-2	Launching Nose Link	a. Examine link for cracking and distortion.	Link is cracked and distorted.
			b. Check security of chain and washer.	Chain and washer are not secure.
61	See Table 2-2	Landing Roller Pedestal Mk 2	a. Check for damage, distortion to frame and lugs (216) and security of bolt on items.	Frame and lugs are damaged or distorted. Bolts on items are not secure.
			b. Check that jackseat (217) moves freely and bolts and pins (218) are secure.	Jackseat does not move freely. Bolts and pins are not secure.

TABLE 2-3. Unit Preventive Maintenance Checks and Services (Continued)

Item No	Interval	Item To Be Checked Or Serviced	Procedure	Not Fully Mission Capable If :
			c. Examine saddle (219) for damage and freedom of movement.	Saddle is damaged and does not move freely.



2-12. PMCS REPORTING.

Illustrations are integrated into the text in Table 2-3. Each illustration is annotated and gridded to show the position of welded items and points for inspection. The annotations commence with the serial number plate. Jaw lugs, where applicable, are numbered from the right. When damage is observed, the inspector is to mark the damaged area on a copy of the illustration. For cross reference the condition and the grid reference is to be recorded. Full details of the damage, such as lengths and widths of weld cracks and the degree of distortion of welded parts must be recorded. The completed illustration is to accompany DA Form 2404, Equipment Inspection and Maintenance Worksheet.

2-13. REPAIR RECORDING.

For those components with illustrations, repair of damage in the unshaded areas is permitted and should be recorded in accordance with DA PAM 738-750.

2-14. PMCS REPORT FORMS.

The illustrations are to be copied and used to report component damage (para. 2-12).

WARNING

The shaded areas on the component illustrations (pages 2-11 to 2-54) indicate safety critical areas where repairs are not permitted. Damage in these shaded areas indicate that the component should be scrapped.

Section V. UNIT TROUBLESHOOTING

2-15. GENERAL

Troubleshooting for MGB is covered at Operator and Direct Support (Chapter 3). Operator troubleshooting can be found in TM 5-5420-212-10-1.

Section VI. UNIT MAINTENANCE PROCEDURES

2-16. GENERAL

CAUTION

MGB primary components are highly stressed and early detection of crack damage is most Important. Delay in detection of cracks may result in complete failure of a component.

a. All components must be cleaned and inspected at regular intervals. If any cracks or damage are noted, items must be repaired at authorized level of maintenance.

b. Periodic inspection by an authorized inspector will be carried out at regular intervals. Visual inspection of all bridge and launching components will be made following each bridge mission.

c. Refer to Unit Preventive Maintenance Checks and Services (Section IV) for inspection procedures.

NOTE

During inspections, pay particular attention to all welds, top and bottom chords of highly stressed components and all connectors and lugs.

TASK	PROCEDURE	PAGE NO
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2-18	Pallet Lifting Ring	2-60
2-19	Pallet Tie Down Ring	2-62
2-20	Pallet Shackles	2-64
2-21	Pallet, Rubber Buffer	2-66
2-22	Pallet, Rear Buffer Assembly	2-68
2-23	Tie-Down, Cargo Aircraft	2-70
2-24	Push Bar, Link	2-72
2-25	Roller Beam, Roller Assembly	2-74
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2-28	Launching Nose Heavy, Dowel Pin	2-80
2-29	Landing Roller Pedestal Mk 1 and Mk 2 (Swivel Pins)	2-83
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2-32	Anchor Assembly, Bonded Bearing	2-90
2-33	Rope, Guard	2-92
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2-39	Post Tensioning Assembly, Guide	2-104
2-40	Post Tensioning Assembly, Catch Assembly	2-106
2-41	Post Tensioning Assembly, Lever Assembly	2-108
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2-44	Post Tensioning Assembly, Sliding Block Bearing Pad Assembly	2-116
2-45	Post Tensioning Assembly, Sliding Block Bearing Strip	2-118
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2-49	Copper Sulphate Test	2-125
2-50	Anti-Skid Coating	2-126

2-17 BOTTOM PANEL, PLUNGER ASSEMBLY

INSERT SUBTITLE HERE

This task covers:

a. Inspection **b. Removal** **c. Service/Repair** **d. Installation**

INITIAL SETUP:

Tools Required

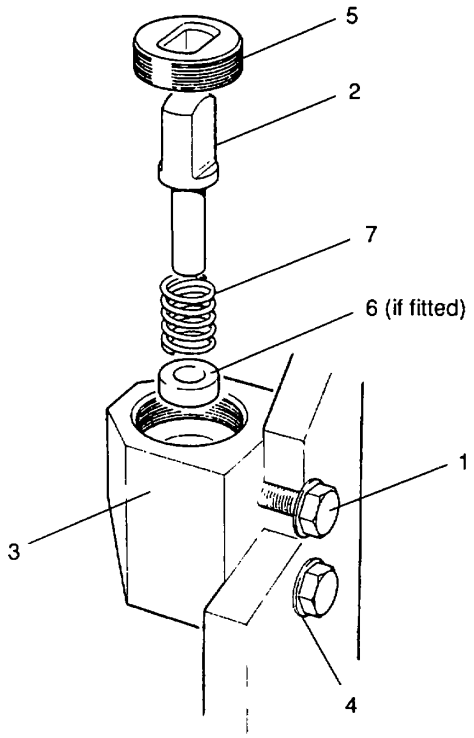
Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Materials Required

Grease Automotive and Artillery (GAA),(1, Appendix C)
Cleaning solvent (3, Appendix C)
Clean cloths
Jointing compound, (6, Appendix C)

Equipment Conditions

Bottom panel on flat surface.
Shootbolt removed (TM 5-5420-212-10-1)



WARNING

Cleaning solvent is toxic and flammable. Use only in well ventilated area and avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts and avoid skin contact.

a. Inspection

(1) Remove any dirt and grease from plunger assembly.
(2) Check screws (1) are tight.
(3) Check plunger (2) for burrs and damaged edges.
(4) Check operation of plunger if plunger is seized. If operation is weak or plunger does not return to extended position, the spring is either weak or broken.
(5) Inspect plunger housing (3) for damage.

b. Removal

(1) Unscrew and remove two screws (1) and washers (4) securing plunger housing (3) to shoot bolt housing, then remove plunger housing.
(2) Unscrew and remove plunger (2) together with guide (5) from plunger housing (3).
(3) Remove washer (6) and spring (7) from plunger housing (3).

c. Service/Repair

(1) Remove grease from plunger housing (3).
(2) Clean all components using cleaning solvent, then wipe dry.
(3) Inspect all components for cracks, breaks, and burrs.
(4) Remove burrs from edges of housing.
(5) Replace components as necessary.
(6) Pack plunger housing with grease (GAA) until it is half full.

d. Installation

(1) Insert washer (6) and spring (7) into plunger housing (3).
(2) Insert plunger (2) into guide (5).
(3) Screw guide and plunger into housing (3) and tighten guide until flush with surface of housing, with long edge of plunger at 90o to centerline of screw holes (1).
(4) Ensure that plunger (2), fully depressed, protrudes above housing (3) no less than 1/4 in (6.4 mm) and no more than 9/32 in (7 mm)
(5) Center punch thread at 120^{o} to lock.

(6) Coat mating surface of plunger housing (3) with jointing compound then secure to shoot bolt housing with two screws (1) and washers (4).

2-18 PALLET LIFTING RING

This task covers:
a. Removal **b. Service/Repair** **c. Installation**

INITIAL SETUP:

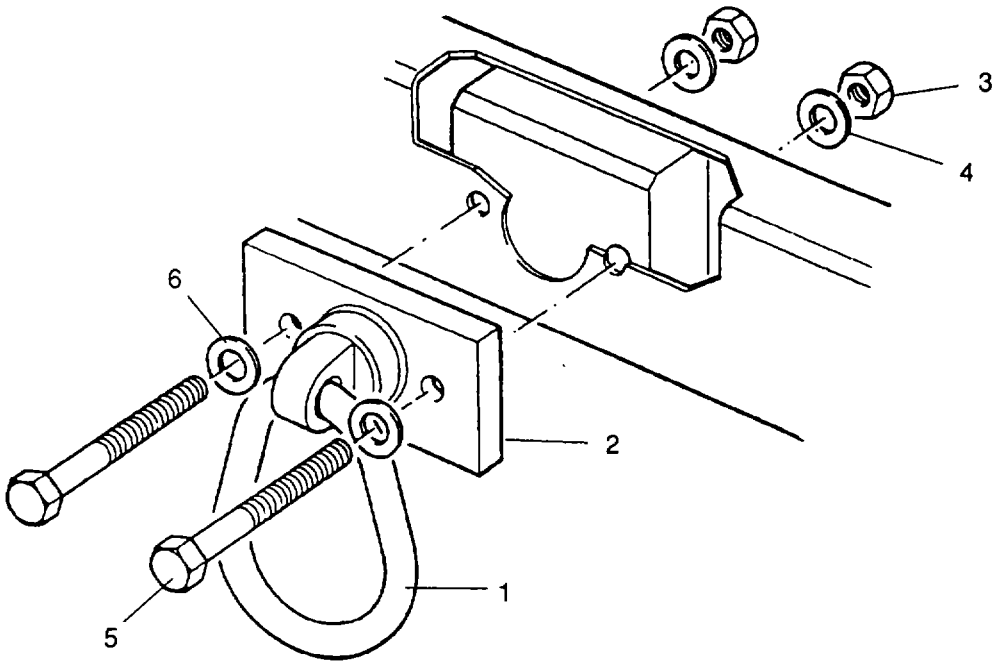
Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Equipment Conditions

Pallet on raised, flat surface

a. Removal



(1) Remove lifting ring (1) from plate nut (2), by turning it counter-clockwise. If threads are tight, a lever may be required.

(2) Unscrew and remove nuts (3) and spring washers (4) from two bolts (5).

(3) Remove bolts (5), flat washers (6) and plate nut (2).

b. Service/Repair

(1) Inspect all components for breaks, cracks, corrosion and other damage. Pay particular attention to threads of lifting ring (1) and bolts (5).
(2) Inspect nuts (3) and bolts (5) for damage to wrench faces.
(3) Inspect spring washers (4) and ensure that they are a helical shape, and not flattened. Discard flattened spring washers.
(4) Replace components as necessary.

c. Installation

(1) Hold plate nut (2) over mounting holes in pallet, and insert two bolts (5), with flat washers (6) between bolt head and face plate.
(2) Place spring washer (4) on each bolt (5).
(3) Screw nuts (3) onto bolts (4) and tighten.
(4) Screw lifting ring (1) into plate nut (2).

2-19 PALLET TIE DOWN RING

This task covers:
a. Removal **b. Service/Repair** **c. Installation**

INITIAL SETUP:

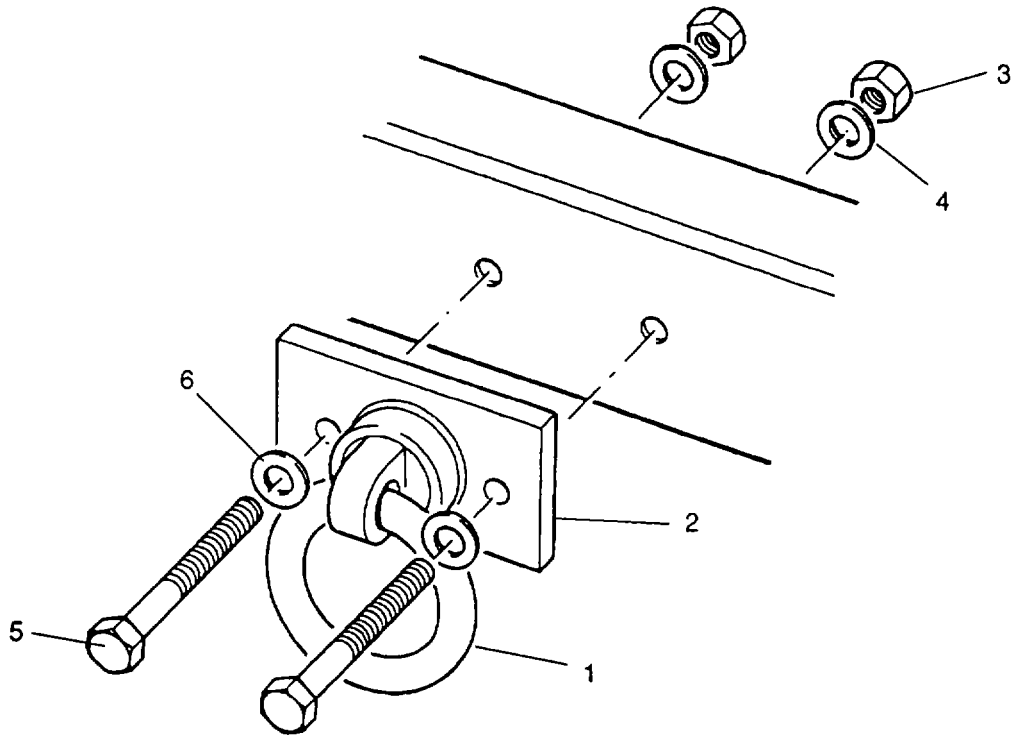
Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Equipment Conditions

Pallet on raised, flat surface

a. Removal



(1) Remove tie-down ring (1) from plate nut (2), by turning it counter-clockwise. If threads are tight, a lever may be required.
(2) Unscrew and remove nuts (3) and spring washers (4) from two bolts (5).
(3) Hold plate nut (2) and remove bolts (5) and flat washers (6) from pallet mounting holes, and from plate nut.

b. Service/Repair

(1) Inspect all components for breaks, cracks, corrosion and other damage. Pay particular attention to threads of tie-down ring (1) and bolts (5).
(2) Inspect nuts (3) and bolts (5) for damage to wrench faces.
(3) Inspect spring washers (4) and ensure that they are a helical shape, and not flattened. Discard flattened spring washers.
(4) Replace components as necessary.

c. Installation

(1) Hold plate nut (2) over mounting holes in pallet, and insert two bolts (5), with flat washers (6) between bolt head and plate nut.
(2) Place spring washer (4) on each bolt (5).
(3) Screw nuts (3) onto bolts (5) and tighten.
(4) Screw tie-down ring (1) into plate nut (2).

2-20 PALLET SHACKLES

This task covers:
a. Removal **b. Service/Repair** **c. Installation**

INITIAL SETUP:

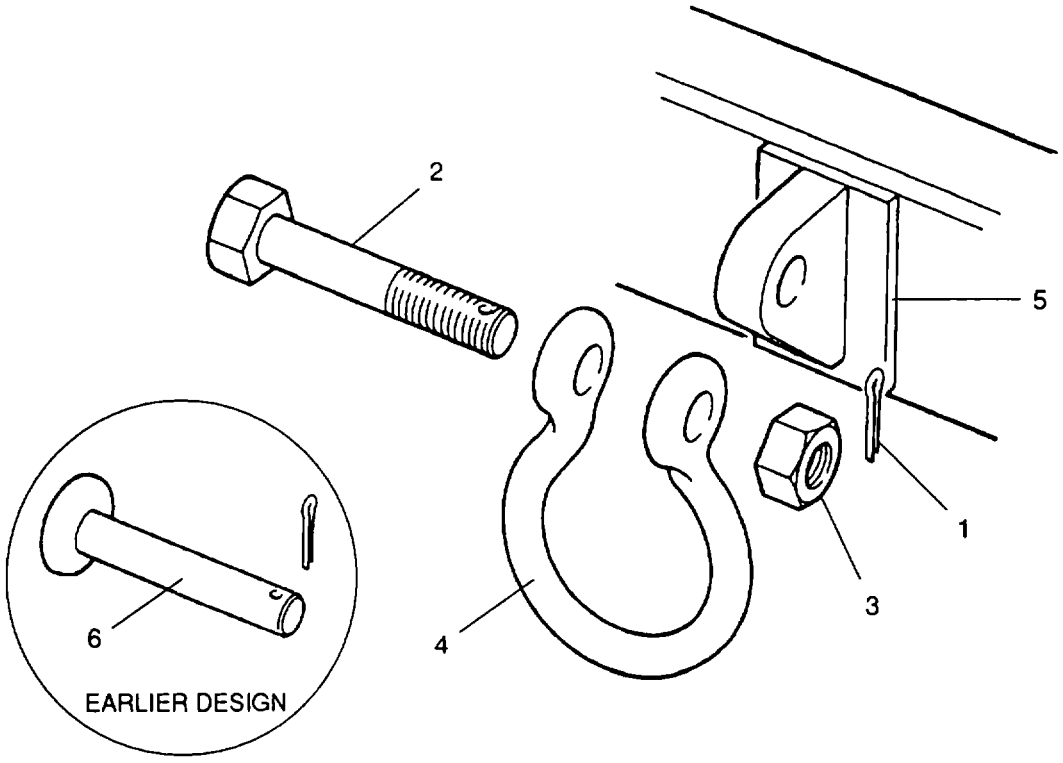
Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Equipment Conditions

Pallet on raised, flat surface

a. Removal



(1) Straighten prongs of cotter pin (1), then remove from shackle bolt (2).
(2) Unscrew nut (3) from shackle bolt (2).
(3) Hold shackle (4), and remove bolt (2) from shackle and shackle anchor assembly (5).
(4) If shackle pin (6) is fitted in place of nut and bolt, remove cotter pin (1) and withdraw shackle pin from shackle and anchor assembly.

b. Service/Repair

(1) Inspect all components for breaks, cracks, corrosion and other damage.
(2) Report full details of damage on shackle anchor assembly to Direct Support Maintenance.
(3) Replace components as necessary.

c. Installation

(1) Slide shackle (4) over shackle anchor assembly (5) so that holes are aligned.
(2) Insert bolt (2) through shackle (4) and anchor assembly. Bolt head must face rubber buffer end of pallet.
(3) Screw nut onto bolt and tighten.
(4) Insert cotter pin (1) through hole in bolt (2), and bend prongs of cotter pin in opposite directions around bolt.
(5) If shackle pin (6) is fitted, insert through shackle (4) and anchor assembly (5) with head of pin facing rear of pallet.
(6) Secure shackle pin (6) with cotter pin (1) bending prongs in opposite directions around shackle pin.

2-21 PALLET, RUBBER BUFFER

This task covers:
a. Removal **b. Service/Repair** **c. Installation**

INITIAL SETUP:

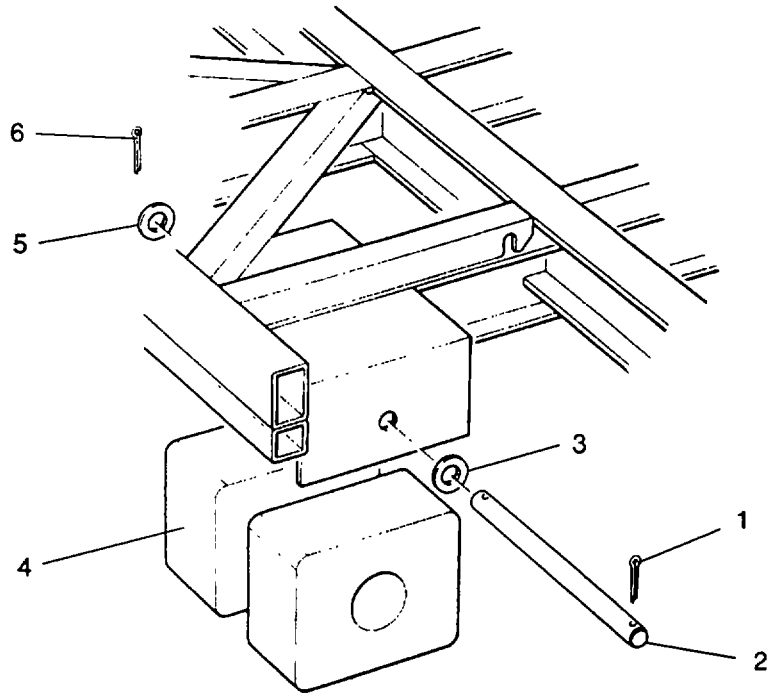
Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Equipment Conditions

Pallet on raised, flat surface

a. Removal



(1) Straighten prongs of cotter pin (1), and remove from pin (2).
(2) Remove flat washer (3) from pin (2).
(3) Withdraw pin (2) from pallet, then remove rubber buffer(s) (4).
(4) If necessary remove flat washer (5) and cotter pin (6) from pin (2).

b. Service/Repair

(1) Inspect components for breaks, cracks and other damage.
(2) Check rubber buffer(s) for deterioration, damage and cracks, in particular around mounting hole.
(3) Replace components as necessary.

c. Installation

(1) Insert cotter pin (6) through pin (2), then bend prongs around pin.
(2) Slide flat washer (5) over pin (2).
(3) Install rubber buffer(s) (4) in pallet, align mounting holes with those in pallet, then insert pin (2).
(4) Slide flat washer (3) over pin (2).
(5) Insert cotter pin (1) through pin (2) and bend prongs in opposite directions, around pin (2).

2-22 PALLET, REAR BUFFER ASSEMBLY

This task covers:

a. Cleaning **b. Inspection** **c. Repair**

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
Shop Equipment, Common No.1, (2, Appendix B, Section III)
Swaging press

Materials Required

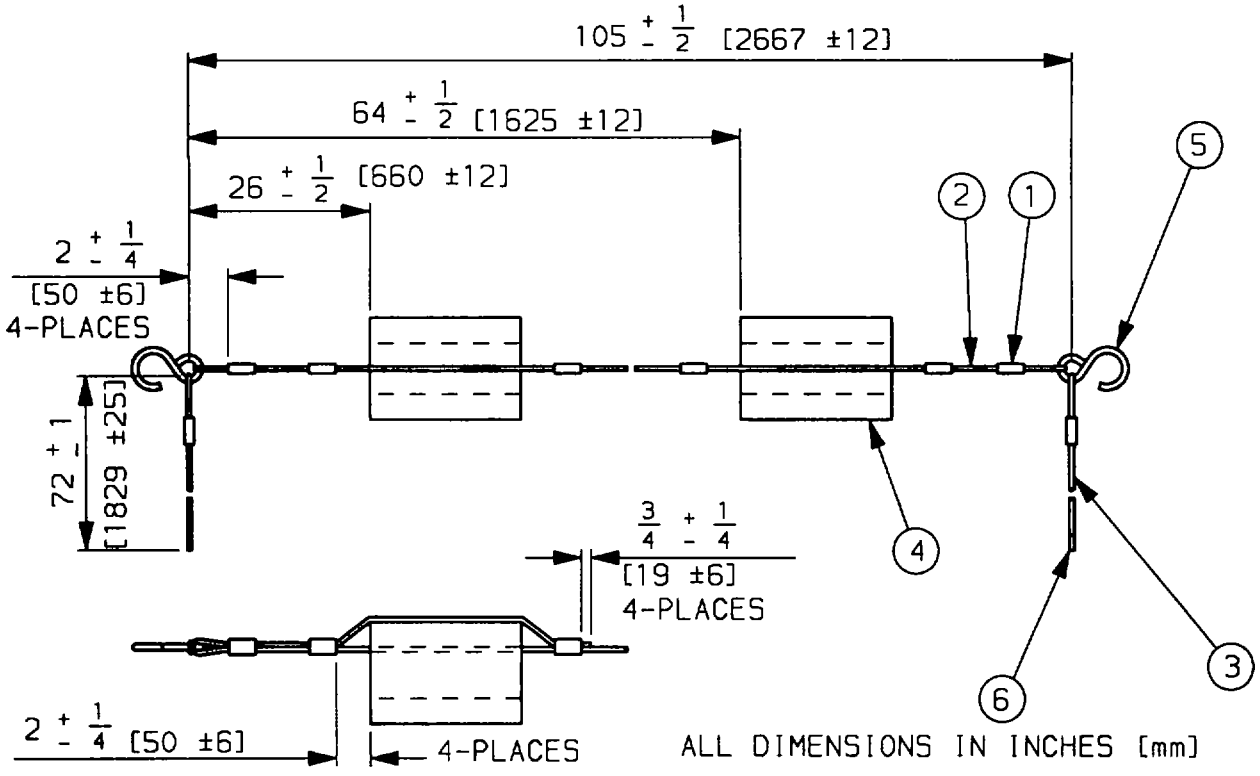
Clean cloths

Equipment Conditions

Buffer assembly on raised flat surface.

a. Cleaning

(1) Remove any dirt or mud with a hand brush.
(2) Wipe with a damp cloth until clean.



b. Inspection

(1) Examine ferrules (1) for security.
(2) Examine ropes (2) and (3) for chafing or wear.
(3) Examine rubber fenders (4) for splits or cracks.
(4) Examine hooks (5) for damage/distortion.
(5) Examine rope sleeves (6) for security.

c. Repair

(1) If rope (2) is badly cut or frayed replace with a new length of rope by cutting free at hooks (5) and either side of rubber fenders (4).
(2) Thread six new ferrules (1) and rubber fenders (4) onto new rope (2), slip rope through hooks (5) at either end and insert rope ends through ferrules (1) and over rubber fenders (4) to the dimensions shown.
(3) Using a swaging press clamp the ferrules (1) to the rope in the positions shown.
(4) If rope (3) is badly damaged replace with new rope through hook (5) and clamp ferrule (1) in position with swaging press.
(5) If rubber fender (4) is severely split replace both fenders and fit new rope as steps (1) to (3) above.

2-23 TIE DOWN, CARGO AIRCRAFT

This task covers:

a. Removal **b. Service/Repair** **c. Installation**

INITIAL SETUP:

Tools Required

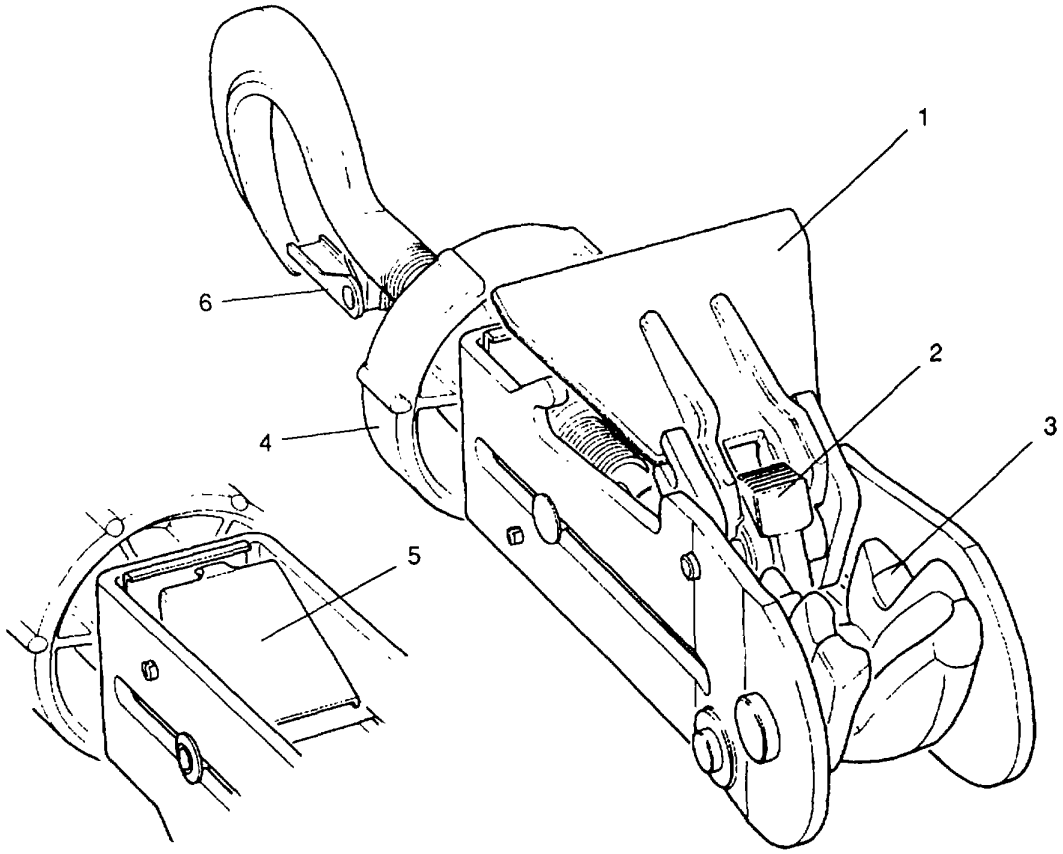
Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
Air compressor (4, Appendix B, Section III)
Shop Equipment Supplemental No.1 (3, Appendix B, Section III)

Materials Required

Lubricating oil, (2, Appendix C)
Clean cloths

Equipment Conditions

Tie down on raised, flat surface



a. Removal (Chain)

(1) Pull back and lift release plate (1).
(2) Press chain release lever (2) so chain link seat (3) can drop back allowing chain to be removed.

b. Service/Repair

WARNING

When using compressed air, wear safety goggles or glasses and ensure that air blast is not directed towards another person.

(1) Use the compressed air to remove dust, dirt and other foreign matter from the moving parts of the assembly.
(2) Inspect body for damage, corrosion or flaking of protective finish.
(3) Remove any burrs or sharp edges with a file.
(4) Lightly oil threads of hook and mating surfaces of moving parts with lubricating oil and wipe all over with an oil soaked cloth before cleaning with dry cloth.
(5) Inspect chain for rust, cracks or breaks.
(6) Operate release plate (1), chain release lever (2), tension adjuster (4), screw ratchet plate (5) and hook latch (6) to check for freedom of movement and spring tension. Replace any broken or missing parts, or weak springs not allowing proper use of equipment.

c. Installation

(1) Fit link of chain into chain link seat (3) and push seat forward into body.
(2) Push release plate (1) down and into locked position.
(3) Pull on chain to ensure mechanism is locked.

2-24 PUSH BAR, LINK

This task covers:
a. Removal **b. Repair** **c. Installation**

INITIAL SETUP:

Tools Required

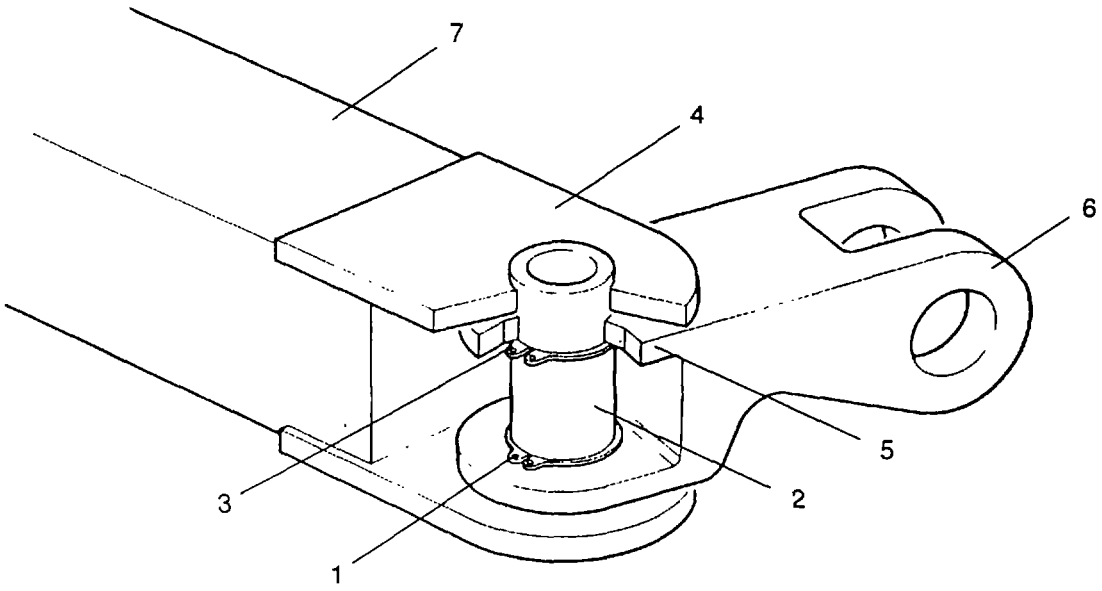
Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
Shop Equipment, Common No.1 (2, Appendix B, Section III)

Materials Required

Lubricating oil, (2, Appendix C)
Clean cloths

Equipment Conditions

Push bar on raised, flat surface



a. Removal

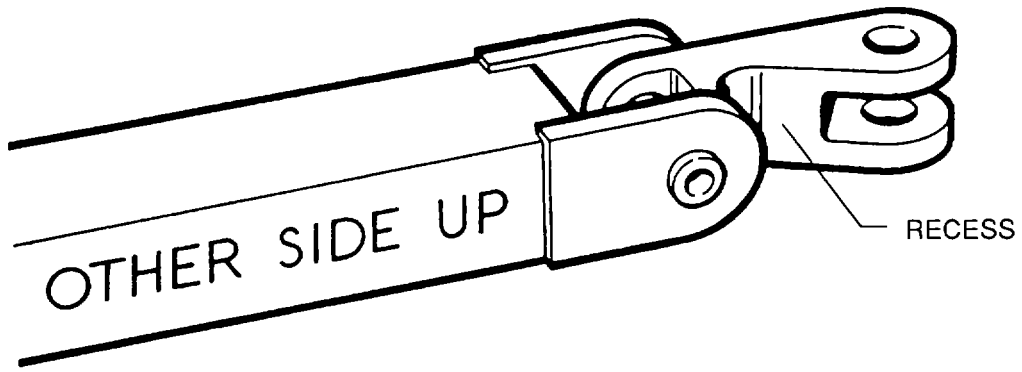
(1) Remove circlip (1) from its groove in pin (2), then slide circlip (1) along pin (2) and up to circlip (3).
(2) Lower pin (2) from top plate (4) and clear of link upper lug (5).
(3) Remove both circlips (1), (3) from pin (2).
(4) Remove pin (2) from push bar (7).
(5) Remove link (6) from push bar (7).

b. Repair

(1) Replace cracked, distorted or broken link (6).
(2) Remove burrs from plates (4) and ends of pin (2).
(3) Replace circlips (1) and (3) if bent or distorted.
(4) Clean all components with an oil soaked cloth, then dry with a clean cloth.

CAUTION

When installing link (6) ensure the recessed portion is on the same side as the "other side up" stencil markings.



c. Installation

(1) Position link (6) in push bar (7), and align holes.
(2) Insert pin (2) through bottom plate (4) and bottom hinged lug of link (5), so that circlips can be installed.
(3) Install circlips (3) and (1) on end of pin (2).
(4) Push pin (2) through top lugs and at the same time, slide circlips (3) and (1) far enough along the pin, to enable pin (2) to locate in all four lugs, with the circlip grooves to the inside of link lugs (5).
(5) Locate circlips (1) and (3) in their grooves on pin (2).
(6) Check link (6) swivels freely.

2-25 ROLLER BEAM, ROLLER ASSEMBLY

This task covers:

a. Inspection **b. Removal** **c. Installation**

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
Air compressor (4, Appendix B, Section III)
Shop Equipment, Supplemental No.1 (3, Appendix B, Section III)

Equipment Conditions

Roller beam on raised flat surface

a. Inspection

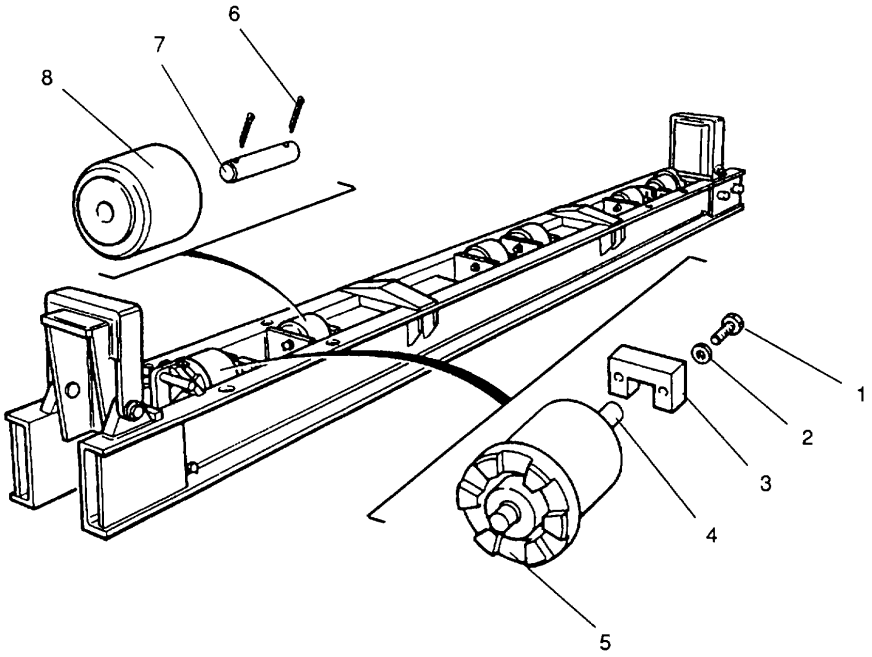
WARNING

When using compressed air, wear safety goggles or glasses and ensure that air blast is not directed towards another person.

(1) Use compressed air to remove dust, dirt and other foreign matter from rollers, and immediate area.
(2) Check to ensure that rollers are not binding, cracked, or worn. If so, report condition of roller assembly to Direct Support Maintenance and replace with complete new assembly.
(3) Check bearing shaft location holes are not elongated. If holes are elongated, report condition to Depot Maintenance.

NOTE

If only one of the two flanged roller assemblies is unserviceable and requires replacing, it is recommended that both assemblies are replaced. Similarly, if any of the four plain rollers is unserviceable replace all four rollers.



b. Removal

(1) Flanged Roller Assembly
  (a) Unscrew and remove the two setscrews (1) and washers (2) securing plate (3) to roller beam, and lift off plate from shaft end (4).
  (b) Remove flange roller assembly (5) from roller beam.

(2) Plain Roller Assembly
  (a) Remove the two cotter pins (6) from headless pin (7).
  (b) Hold plain roller assembly (8) and remove headless pin (7).
  (c) Remove plain roller assembly from roller beam.

c. Installation

(1) Flanged Roller Assembly
  (a) Place new flanged roller assembly (5) into roller beam and position plate (3) over shaft end (4).
  (b) Secure plate (3) to roller beam with two washers (2) and setscrews (1).

(2) Plain Roller Assembly
  (a) Position new plain roller assembly (8) in roller beam, and insert headless pin (7).
  (b) Insert cotter pins (6) through holes in headless pin (7), and bend the prongs in opposite directions around the pin.

2-26 HYDRAULIC JACK 15T

This task covers:
a. Inspection **b. Removal** **c. Installation**
d. Service

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Materials Required

Lubricating oil, (2, Appendix C)
Clean cloths

Equipment Conditions

Jack removed from pallet load and placed on raised, flat, clean surface

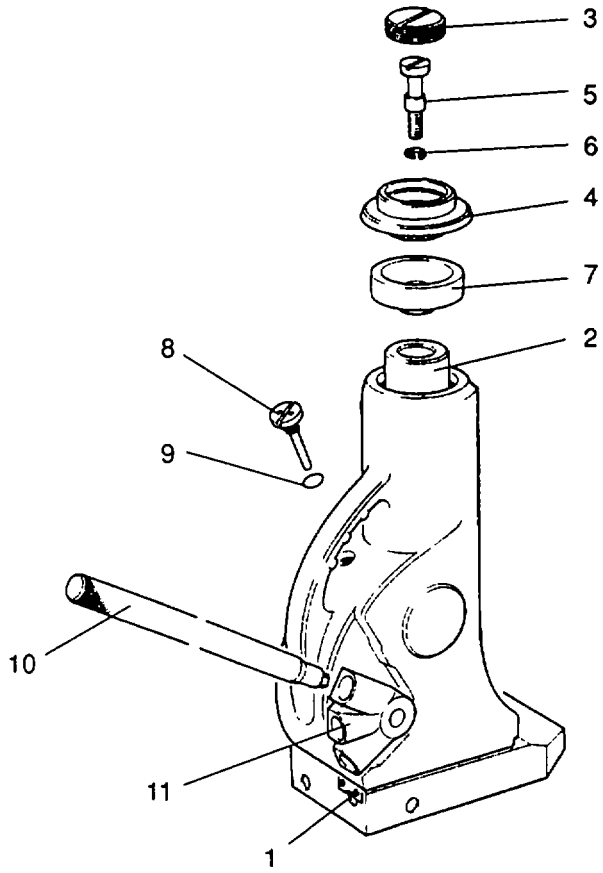
a. Inspection

(1) Inspect the hydraulic jack for leaks and cracks; broken, damaged or missing parts.
(2) Report full details of jack damage to Direct Support Maintenance. A damaged swivel cradle may be replaced; otherwise the jack shall be replaced with a serviceable item.

b. Removal

CAUTION
Special care must be taken when disassembling components, to ensure freedom from grit, etc.

(1) Loosen release valve screw (1) 1 - 1 1/2 turns and press ram (2) down as far as it will go.
(2) Unscrew and remove retainer plate (3), from swivel cradle (4).
(3) Remove cap pin (5), lock washer (6), swivel cradle (4) and cradle seat (7) from ram (2).
(4) Clean components with a clean cloth soaked in hydraulic oil then wipe dry with a clean cloth.
(5) Inspect components for wear, cracks, burrs and chips and replace as necessary. Ensure cap pin (5) is not bent.



c. Installation

(1) Position cradle seat (7) and swivel cradle (4) on ram (2), and secure to ram with cap pin (5) and new lock washer (6).
(2) Screw retainer plate (3) into swivel cradle (4).

d. Service

(1) Remove filler cap/dipstick (8) and inspect gasket (9); replace if necessary.
(2) Fill to no more than 1 inch (25 mm) above mark on dipstick (8) with fresh clean lubricating oil.
(3) Replace and tighten filler cap/dipstick (8) and gasket (9).
(4) Check that release valve screw (1) is tight.
(5) Insert operating lever (10) into quadrant (11).
(6) Operate pump until ram has risen to full extension of 12 in (304 mm).
(7) Unscrew release valve screw (1) no more than 1 - 1 1/2 turns.
(8) Press ram down as far as it will go and listen for the release of air.
(9) Tighten release valve screw (1).
(10) Repeat steps (6) to (9) until all air has been removed from system.

2-27 HYDRAULIC JACK 20T

This task covers:
a. Inspection **b. Removal** **c. Installation**
d. Service

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (1, Appendix B, Section III)

Materials Required

Lubricating oil, (2, Appendix C)
Clean cloths

Equipment Conditions

Jack placed on raised, flat, clean surface

a. Inspection

(1) Inspect the hydraulic jack for leaks and cracks; broken, damaged or missing parts.
(2) Report full details of jack damage to Direct Support. A damaged swivel cradle may be replaced otherwise the jack shall be replaced with a serviceable item.

b. Removal

CAUTION
Special care must be taken when disassembling components, to ensure freedom from grit, etc.

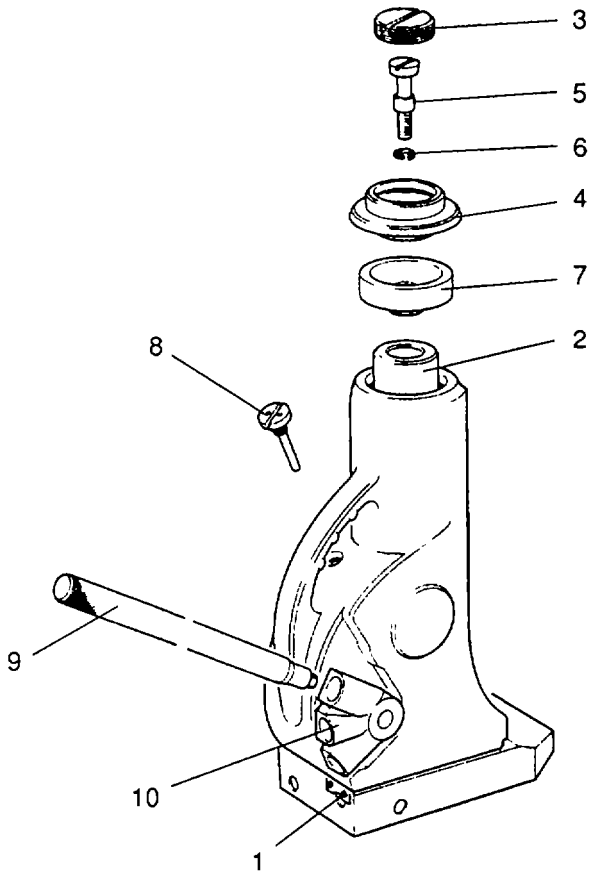
(1) Loosen release valve screw (1) 1 - 1 1/2 turns and press ram (2) down as far as it will go.
(2) Unscrew and remove keeper plate (3), from swivel cradle (4).
(3) Remove cap pin (5), lock washer (6), swivel cradle (4) and swivel cradle seat (7) from ram (2).
(4) Clean components with a clean cloth soaked in hydraulic oil then wipe dry with a clean cloth.
(5) Inspect components for wear, cracks, burrs and chips. Ensure cap pin (5) is not bent.

c. Installation

(1) Position cradle seat (7) and swivel cradle (4) on ram (2), and secure to ram (2) with cap pin (5) and lock washer (6).
(2) Screw keeper plate (3) into swivel cradle (4).

d. Service

(1) Remove filler screw/dipstick (8).
(2) Fill to no more than 1 in (25 mm) above mark on dipstick (8) with fresh clean lubricating oil.
(3) Install filler screw (8) and hand tighten only.
(4) Check that release valve screw (1) is tight.
(5) Insert operating lever (9) into quadrant (10).
(6) Operate pump until ram has risen to full extent of 12 in (304 mm).
(7) Unscrew release valve screw no more than 1 - 1 1/2 turns.
(8) Press ram down as far as it will go and listen for release of air.
(9) Tighten release valve (1).
(10) Repeat steps (6) to (9) until all air has been removed from the system.



2-79

2-28 LAUNCHING NOSE HEAVY, DOWEL PIN

This task covers:
a. Inspection **b. Removal** **d. Installation**

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
Drift pin 1 in (25 mm) diameter
Dowel pin extraction tool (14, Appendix B, Section III)

Materials Required

Penetrating oil (8, Appendix C)
Clean cloths
Crocus cloth (10, Appendix C)

Equipment Conditions

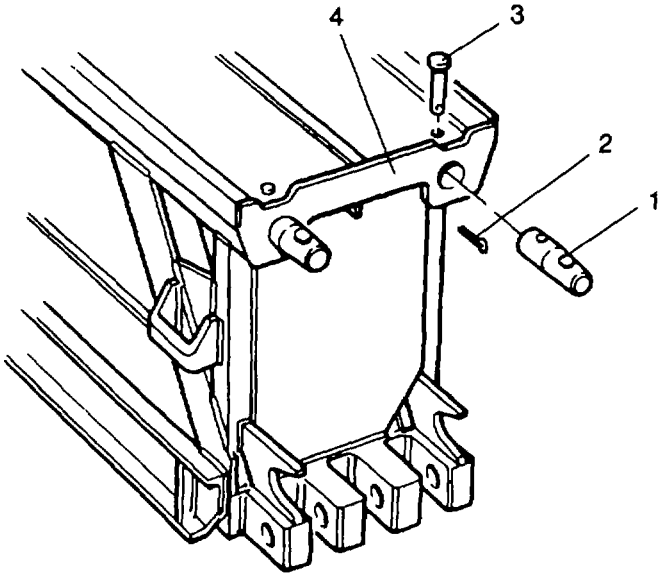
Launching nose laid on trestles.

a. Inspection

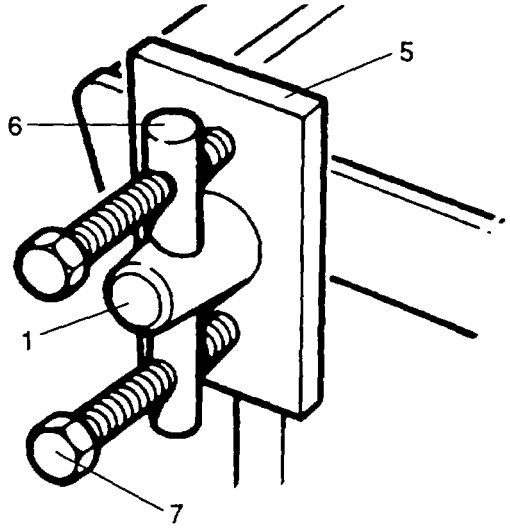
(1) Clean ends of dowel pins (1) with cloth and examine for burrs, damage and distortion. Any slight burrs, remove with crocus cloth or smooth file.
(2) If pin is severely damaged such that the shoot bolt cannot be engaged, then replace dowel pin (1).

b. Removal

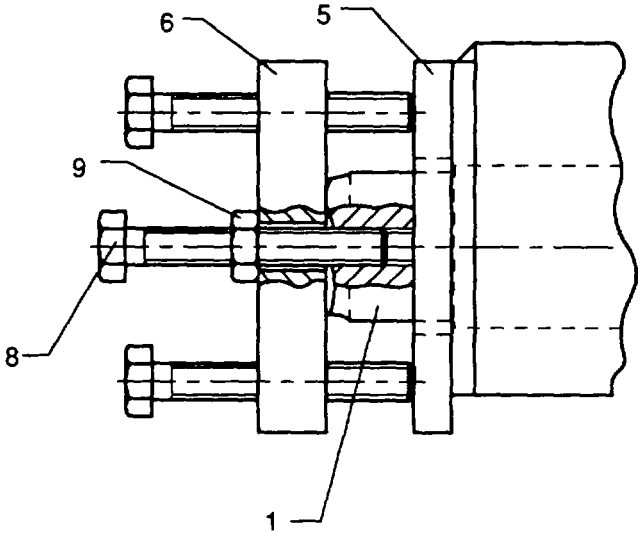
(1) Remove cotter pin (2) and drive out headed pin (3) from inside frame using hammer and drift pin.
(2) Scrape away any paint at junction of dowel pin (1) and thrust face (4). Apply penetrating oil to area and leave for 5 minutes.
(3) Position plate (5) over dowel pin (1) and slip puller bar (6) through dowel hole.
(4) Insert two bolts (7) and tighten until dowel pin (1) is eased out.
(5) Should end of dowel pin (1) be damaged, or broken off, such that two bolts will not remove it, drill and tap 1/2 in UNF hole through center of dowel pin (1), as shown opposite, and screw in third bolt (8) to a depth of approximately 1 in (25 mm). Tighten nut (9) up to puller bar (6).
(6) Remove dowel pin (1) as in step (4) above.



USE OF TOOL - DOWEL INTACT



USE OF TOOL - DOWEL BROKEN



c. Installation

(1) Remove any scale and debris in and around hole through thrust face with crocus cloth.
(2) Clean headed pin (3) with cloth or crocus cloth as necessary.
(3) Tap new dowel pin (1) into housing using plastic mallet, until headed pin (3) can be inserted.
(4) Drive headed pin (3) fully in and secure with new cotter pin (2).
(5) Repair any damage to painted surface by patch painting in accordance with TM 43-0139, Painting Instructions for Army Materiel.

2-29 LANDING ROLLER PEDESTAL Mk 1 AND Mk 2 (SWIVEL PINS)

This task covers:

a. Removal **b. Installation**

INITIAL SETUP:

Tools Required

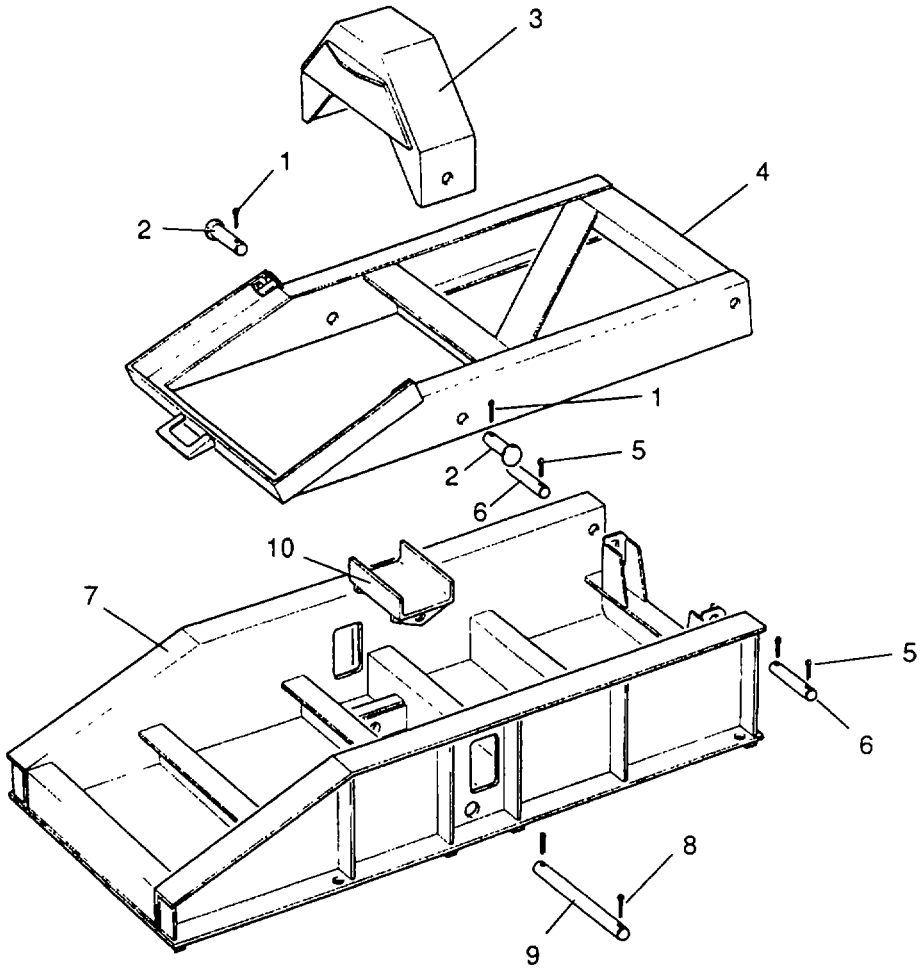
Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Materials Required

Clean cloths

Equipment Conditions

Landing roller pedestal on flat surface with frame supported in vertical position



2-83

WARNING

Serious injury to personnel or damage to component may occur if frame (4) is not safely supported when lifted to ease repair.

NOTE

The procedures for the repair of the Mk 1 and Mk 2 landing roller pedestals are the same. Do not interchange Mk 1 and Mk 2 components. Lifting the frame (4) to the vertical position will ease repair.

a. Removal

(1) Saddle Pins
   (a) Remove cotter pins (1) from straight headed pins (2).
   (b) Support saddle (3), then remove both pins (2).
   (c) Lift saddle (3) from frame (4).

(2) Frame/Frame Support Pins
   (a) Remove cotter pins (5) from headless pins (6).
   (b) Support frame (4), then remove both headless pins (6).
   (c) Lift frame (4) from frame support (7).

(3) Jack Seat Pin
   (a) Remove cotter pins (8) from headless pin (9).
   (b) Remove the headless pin (9).
   (c) Lift jackseat (10) from frame support (7).

b. Installation

(1) Jack Seat Pin
   (a) Clean pin holes in frame support (7) and jack seat (10), and wipe headless pin (9) clean.
   (b) Position jack seat (10) in frame support, align pin holes then insert headless pin (9).
   (c) Insert cotter pins (8), through each end of pin (9), then bend prongs of cotter pins in opposite directions around pin.

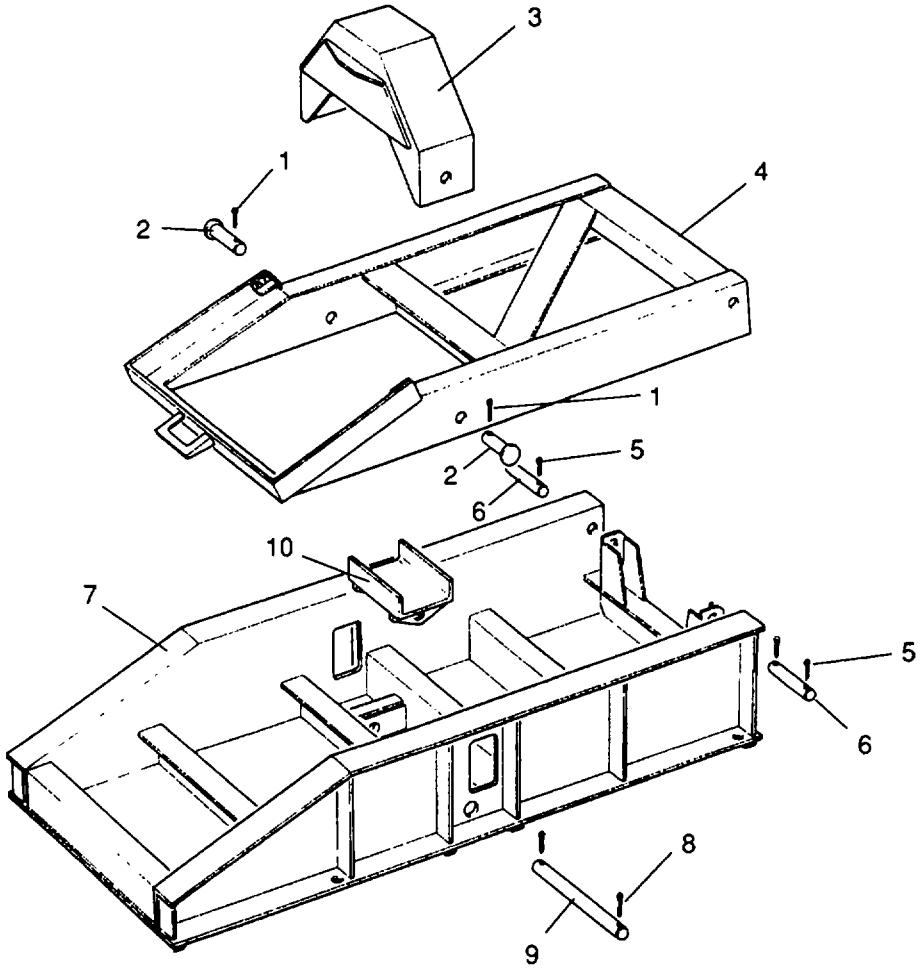
(2) Saddle Pins

   (a) Clean pin holes in saddle (3) and frame (4), and wipe straight headed pins (2) clean.
   (b) Align holes in saddle (3) and frame (4), then insert straight headed pins (2).

(c) Insert cotter pins (1), one through each pin (2), then bend prongs of cotter pins in opposite directions around pins.

(3) Frame/Frame Support Pins

(a) Clean pin holes in frame (4) and frame support (7), and wipe headless pins (6) clean.
(b) Position frame (4) in frame support (7), align pin holes, then insert headless pins (6).
(c) Insert cotter pins (5), through each end of pins (6), then bend prongs of cotter pins in opposite directions around pins.



2-30. LANDING ROLLER, ROLLER ASSEMBLY

This task covers:

a. Inspection **b. Removal** **c. Installation**

INITIAL SETUP:

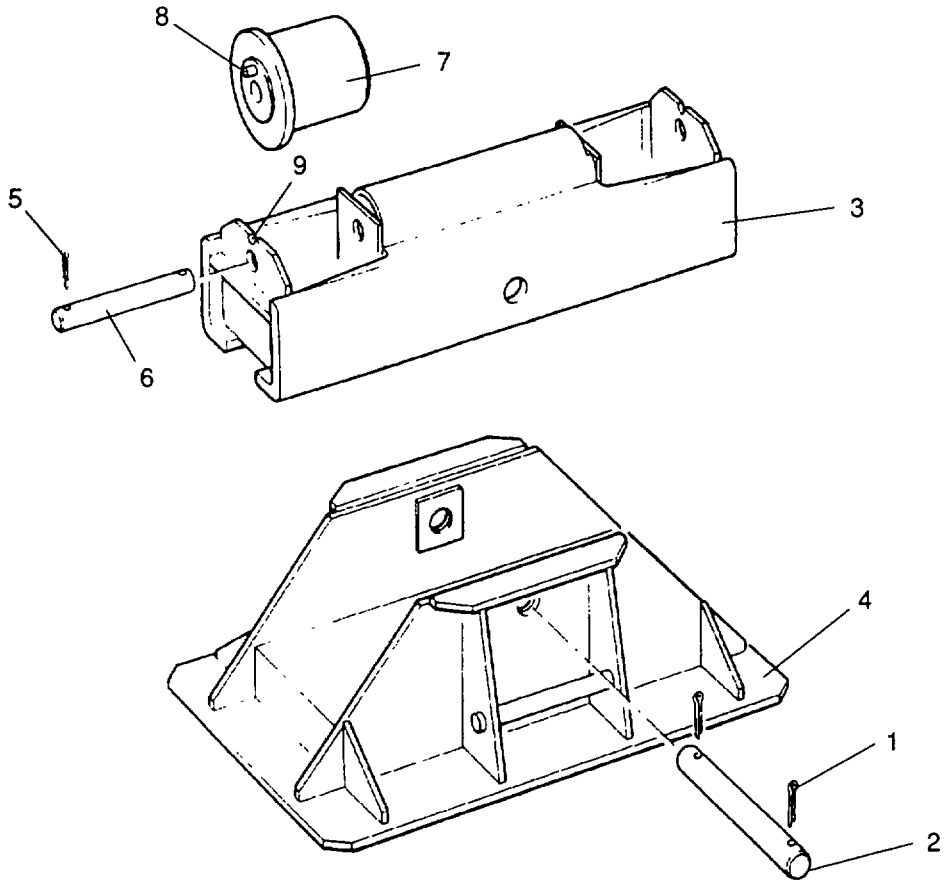
Tools Required

Tool Kit, General Mechanics, Automotive (GMTK) (1, Appendix B, Section III)
Air compressor (4, Appendix B, Section III)
Shop Equipment, Supplemental No. 1 (3, Appendix B, Section III)

Equipment Conditions

Landing roller on raised, flat surface

NOTE
Rollers must be replaced in pairs.



a. Inspection

WARNING

When using compressed air, wear safety goggles or glasses and ensure that air blast is not directed towards another person.

(1) Use compressed air to remove dust, dirt and other foreign matter from rollers.
(2) Check to ensure that rollers are not binding, cracked, or worn. If so, report condition to Depot Maintenance and replace with a complete new assembly.
(3) Check headless pin (6) location holes are not elongated. If holes are elongated report condition to Depot Maintenance.

b. Removal

(1) Remove cotter pins (1) from headless pin (2) which secures carrier (3) to base (4).
(2) Remove headless pin (2) and lift out carrier (3).

NOTE

Access to inner cotter pins is gained from beneath the carrier. Place carrier on its side.

(3) Remove cotter pins (5) from headless pin (6).
(4) Remove headless pin (6) and remove roller assembly (7) from carrier (3).
(5) Repeat procedure for other roller assembly.

c. Installation

(1) Install new roller assembly (7) in carrier (3), with spring pin (8) positioned in U-shaped slot (9) in carrier.
(2) Insert headless pin (6) through carrier and roller.
(3) Insert cotter pins (5), one in each end of headless pin (6), and bend the prongs in opposite directions around the pin.
(4) Repeat procedure for other assembly.
(5) Position carrier in base and insert pin (2), then fit cotter pins (1) bending prongs around the pin.

2-31 LAUNCHING NOSE ROLLER, ROLLER ASSEMBLY

This task covers:

a. Inspection **b. Removal** **c. Installation**

INITIAL SETUP:

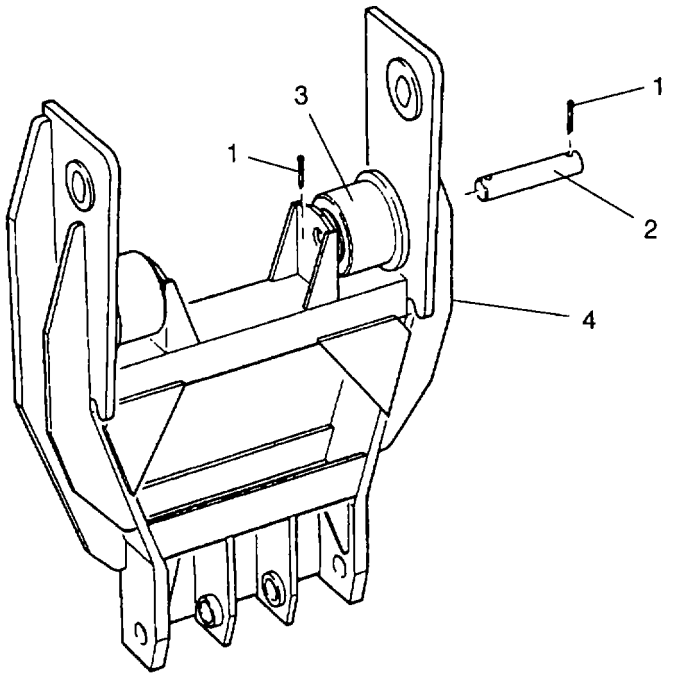
Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
Air compressor (4, Appendix B, Section III)
Shop Equipment, Supplemental No.1 (3, Appendix B, Section III)

Equipment Conditions

Launching nose roller on raised, flat surface

NOTE
Rollers must be replaced in pairs.



a. Inspection

WARNING

When using compressed air, wear safety goggles or glasses and ensure that air blast is not directed towards another person.

(1) Use compressed air to remove dust, dirt and other foreign matter from rollers.
(2) Check to ensure that rollers are not binding, cracked, or worn. If so, report condition to Depot Maintenance and replace with a complete new assembly.
(3) Check headless pin (2) location holes are not elongated. If holes are elongated, report condition to Depot Maintenance.

b. Removal

(1) Remove the cotter pins (1) from the headless pin (2).
(2) Hold the roller assembly (3) and withdraw the headless pin (2).
(3) Remove the roller assembly (3) from the frame (4).
(4) Repeat procedure for other assembly.

c. Installation

(1) Position roller assembly (3) in the frame (4) and insert the headless pin (2).
(2) Insert the cotter pins (1), one in each end of the headless pin (2), and bend the prongs in opposite directions around the pin.
(3) Repeat procedure for other assembly.

2-32 ANCHOR ASSEMBLY, BONDED BEARING

This task covers:

a. Inspection **b. Removal** **c. Installation**

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
Fitting and extracting tool, (5, Appendix B, Section III)

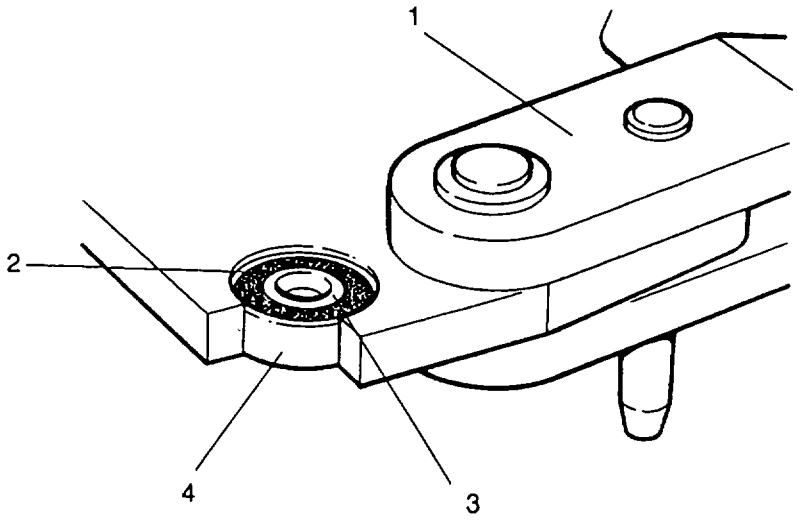
Materials Required

Thread locking compound (4, Appendix C)

Equipment Conditions

Anchor assembly on raised, flat surface with fork end anchors in stowed position

a. Inspection



(1) With the fork end anchors (1) in the stowed position to expose the bonded bearings, fit a bracing pin into the bonded bearing.
(2) Move the pin from side to side to check if rubber(2) is separating from inner sleeve (3) or outer sleeve (4).
(3) Replace bonded bearing if there is any sign of tearing, or cracking of rubber (2).

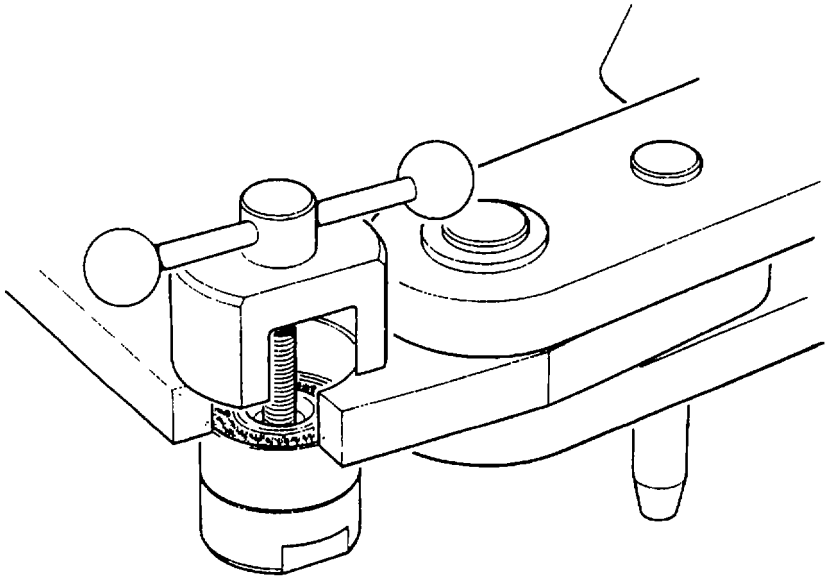
b. Removal

NOTE
Bonded bearings must be replaced in pairs.

(1) Using the fitting and extracting tool, remove both bonded bearings.
(2) Discard both bonded bearings.

c. Installation

(1) Inspect hole in anchor link and check for burrs around edge of hole.
(2) Carefully remove any burrs with a file.
(3) Clean inside of hole with a clean cloth.
(4) Ensure outside surfaces of new bearings are clean, then coat with thread locking compound.
(5) Fit new bearings using the fitting and extracting tool, as shown.



(6) Check that outer cases of bearings do not protrude above either side of anchor link plate, by more than 0.0126 in (0.32 mm).
(7) Check that fork end anchors swivel freely.

2-33 ROPE, GUARD

This task covers:

a. Inspection **b. Removal** **c. Installation**

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Materials Required

Rope, 0.394 in (10 mm) diameter x 360 in (9144 mm) long, 8 plait green polyester with ends heat sealed

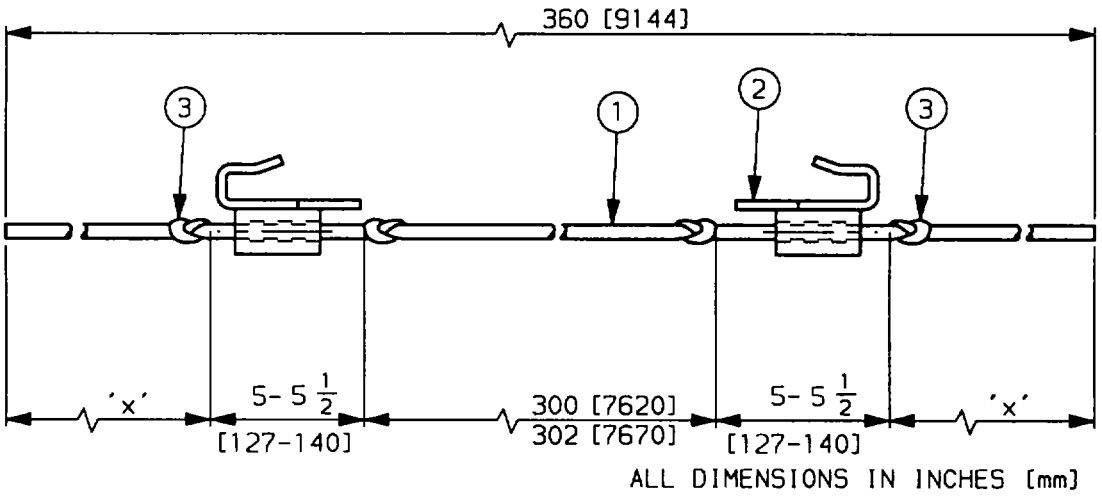
Equipment Conditions

Guard rope laid on a bench.

a. Inspection

(1) Examine rope (1) for chafing and wear, particularly where it passes through hook assemblies (2).
(2) Examine hook assemblies (2) for damage and distortion.

b. Removal/Installation



(1) If rope (1) is undamaged and hook assembly (2) needs replacing, undo outer knot (3), remove old and fit new hook assembly (2), ensuring that knot is in same approx. position as before.
(2) If hook assemblies (2) are undamaged and rope needs replacing, cut rope at either side of hooks.

(3) Tie knot (3) in one end of new rope, thread hook assembly (2) onto rope and tie another knot.
(4) Tie knot at other end, thread hook assembly (2) on and secure with second knot.

NOTE

Ensure positions of hooks and knots agree with dimensions on I illustration. "X" dimensions to be equal within 2 in (50 mm).

2-34 DAVIT POST ASSEMBLY, LEVELLING SCREW

This task covers:

a. Removal **b. Service/Repair** **c. Installation**

INITIAL SETUP:

Tools Required

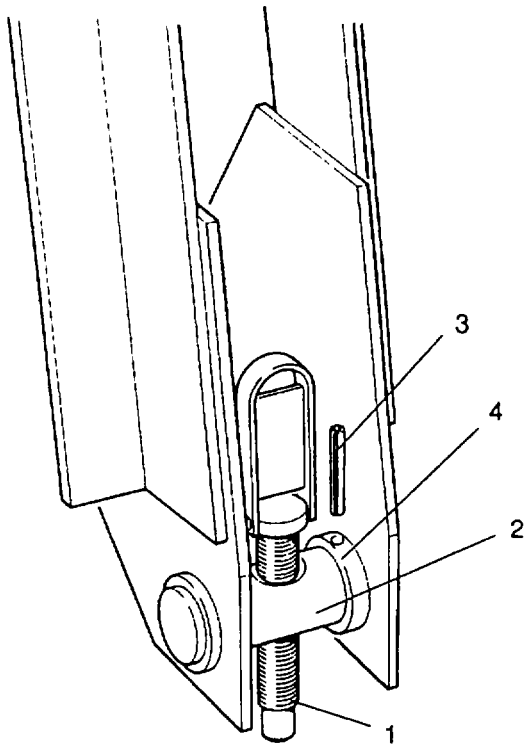
Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Materials Required

Lubricating oil, (2, Appendix C)
Grease, Automotive and Artillery (GAA) (1, Appendix C)
Cleaning cloths

Equipment Conditions

Davit post on raised, flat surface



a. Removal

(1) Unscrew or, if damaged, cut off levelling screw (1) from pin (2).
(2) Remove remaining portion of levelling screw from pin (2).
(3) Remove spring pins (3), then slide out pin (2) from davit post bosses (4).

b. Service/Repair

(1) If levelling screw is undamaged, clean threads with an oil soaked cloth, then dry with a clean dry cloth.
(2) Apply a light coat of grease (GAA) to threads of levelling screw.
(3) Inspect pin (2) for damage. Pay particular attention to threads, especially if bent or broken levelling screw has been removed.
(4) Replace pin (2) if necessary.

c. Installation

(1) Locate pin (2) in davit post bosses (4).
(2) Align holes in pin (2) and bosses (4) then insert spring pins (3).
(3) Screw levelling screw (1) into pin (2).

2-35 DAVIT POST ASSEMBLY, PULLEY AND PINS

This task covers:

a. Service **b. Removal** **c. Installation**

INITIAL SETUP:

Tools Required

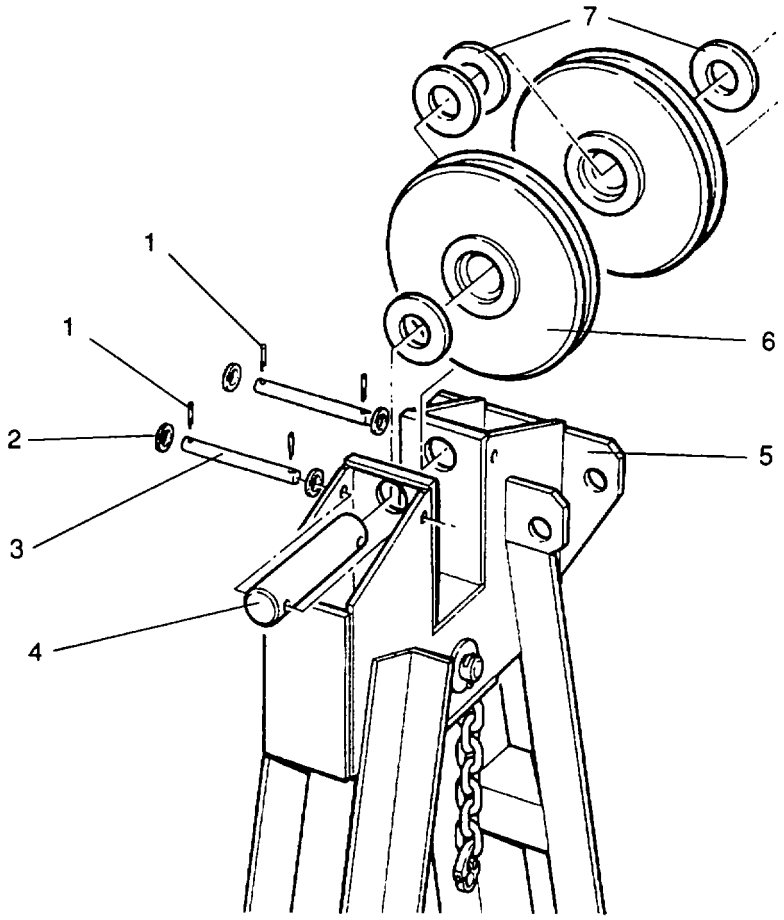
Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Materials Required

Clean cloths
Cleaning solvent (3, Appendix C)

Equipment Conditions

Pulleys in davit post.
Davit post on raised, flat surface



a. Service

WARNING

Cleaning solvent is toxic and flammable. Use only in well ventilated area and avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts and avoid skin contact.

(1) Remove all grease, oil and dirt from pulleys with cleaning solvent.
(2) Dry pulleys with a clean cloth.
(3) Examine pulleys for burrs, chips, distortion and damage.
(4) Remove burrs with a file.
(5) Examine grooves in pulleys for wear and damage.
(6) Check that pulleys rotate freely.
(7) Check for play between pulleys (6) and pulley pin (4), and pulley pin and retaining pins (3).

b. Removal

(1) Remove cotter pins (1) and plain washers (2) from retaining pins (3).
(2) Remove pins (3) from pulley pin (4) and davit post (5).
(3) Support pulleys (6) and remove pulley pin (4) together with thrust washers (7).
(4) Remove pulleys (6) from davit post (5).

c. Installation

(1) Clean all components.
(2) Insert thrust washers (7) in pulley recesses.
(3) Install pulleys (6) in the davit post (5), and align pulley bores with holes in davit post.
(4) Insert pulley pin (4), and align retaining pin (3) holes with those in davit post.
(5) Insert pins (3), through davit post and pulley pins (4).
(6) Refit plain washers (2) at each end of retaining pins (3) then insert cotter pins (1). Bend prongs of cotter pins around retaining pins.

2-36 DAVIT POST ASSEMBLY, CHAINS

This task covers:

a. Removal **b. Installation**

INITIAL SETUP:

Tools Required

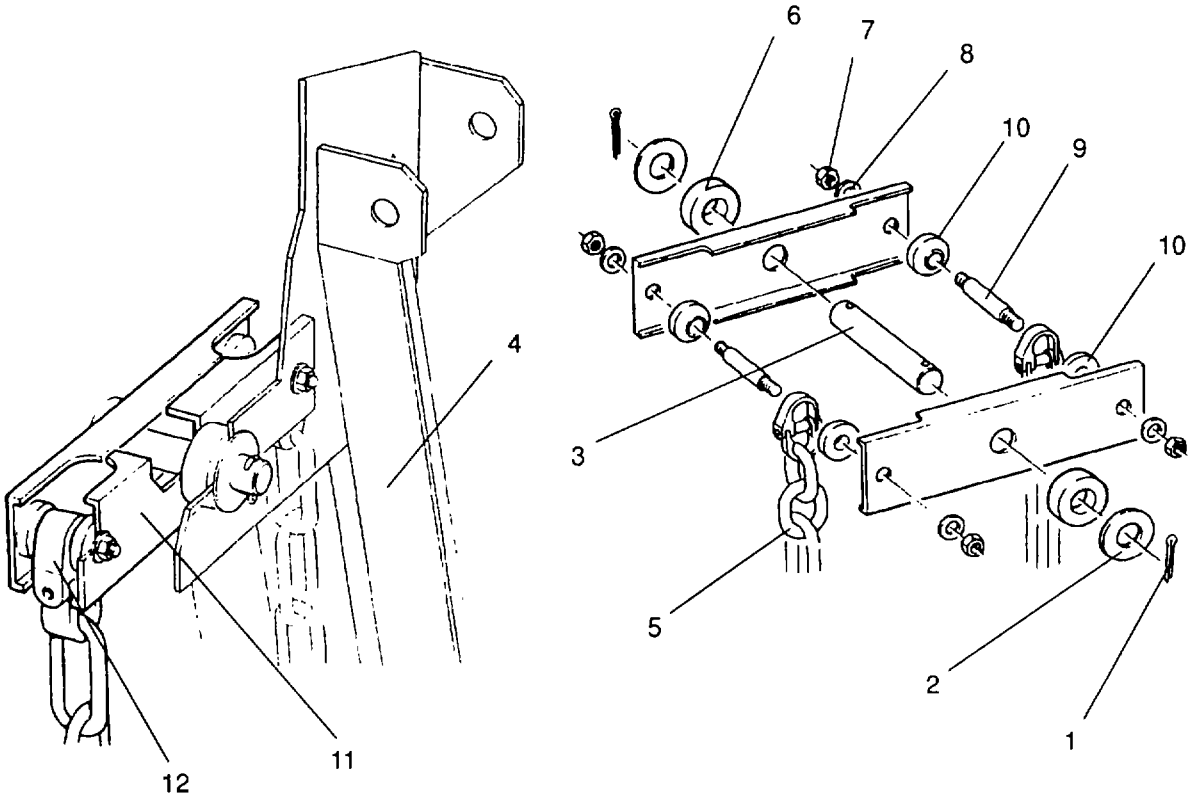
Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Materials Required

Clean cloths
Cleaning solvent (3, Appendix C)
Thread locking compound (4, Appendix C)

Equipment Conditions

Pins and chains in davit post.
Davit post laid flat on raised, flat surface



a. Removal

(1) Remove cotter pin (1) and plain washers (2) from ends of pin (3).
(2) Remove pin (3) from davit post (4).
(3) Grasp chains (5) and withdraw chain suspension assembly from davit post (4). Collect spacers (6).
(4) Unscrew and remove nuts (7) and remove plain washers (8) from threaded ends of spacer (9).
(5) Remove spacer (9), with collars (10) and chain (5) from channels (11).
(6) Remove collars (10) and chain (5) from spacer (9).

b. Installation

WARNING

Cleaning solvent, is toxic and flammable. Use only in well ventilated area and avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts and avoid skin contact.

(1) Remove thread locking compound from threaded ends of spacer (9) with cleaning solvent.
(2) Assemble collars (10) and chain (5) onto spacer (9).
(3) Apply thread locking compound to threads of spacer (9).
(4) Locate ends of spacer (9) in channels (11), then assemble plain washers (8) and nuts (7) onto ends of spacer (9).

NOTE

Coupling link (12) must pivot freely on spacer (9).

(5) Tighten nuts (7).
(6) Install chain suspension assembly in davit post (4).
(7) Position spacers (6) between channels (11) and inside of davit post (4).
(8) Insert pin (3) through davit post (4), spacers (6) and chain suspension assembly.
(9) Assemble plain washers (2) on pin (3), then insert cotter pins (1) through end of pin. Bend prongs of cotter pins in opposite directions around pin.

2-37 ANTI-FLUTTER TACKLE

This task covers:

a. Inspection **b. Removal/Installation**

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Materials Required

Rope, 0.394 in (10 mm) diameter x 128 in (3251 mm) long, 8 plait green polyester

Equipment Conditions

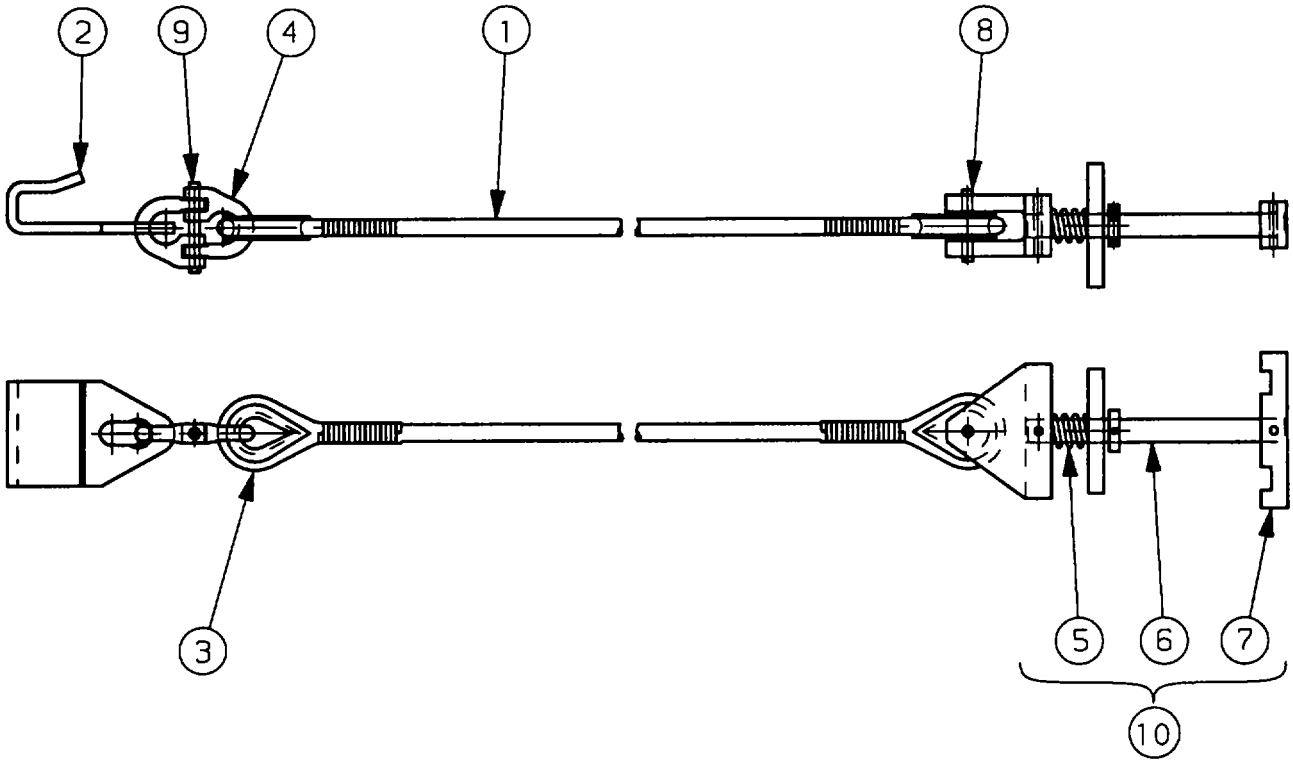
Anti-flutter tackle on raised, flat surface.

a. Inspection

(1) Examine rope assembly (1) for chafing and wear.
(2) Examine hook (2) and thimbles (3) for damage and distortion.
(3) Check coupling (4) for freedom of movement.
(4) Check tension in toggle bar spring (5), then check for damage and distortion in spindle (6) and foot (7).

b. Removal/Installation

(1) If rope needs replacement, drive out pins (8) and (9) and remove rope assembly (1).
(2) Fit new rope and secure with pins (8) and (9).
(3) If hook (2), or coupling (4) need replacing, remove and fit new component.
(4) If toggle bar assembly (10) needs replacing, drive out spring pin (8) and remove assembly from rope.
(5) Fit new toggle bar assembly (10) and secure in place with spring pin (8).


2
9
4
1
8
3
5
6
7
10

2-38 LIGHT TACKLE

This task covers:

a. Inspection **b. Removal/Installation**

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Materials Required

Rope, 0.394 in (10 mm) diameter x 360 in (9114 mm) long, 8 plait green polyester with ends heat sealed

Equipment Conditions

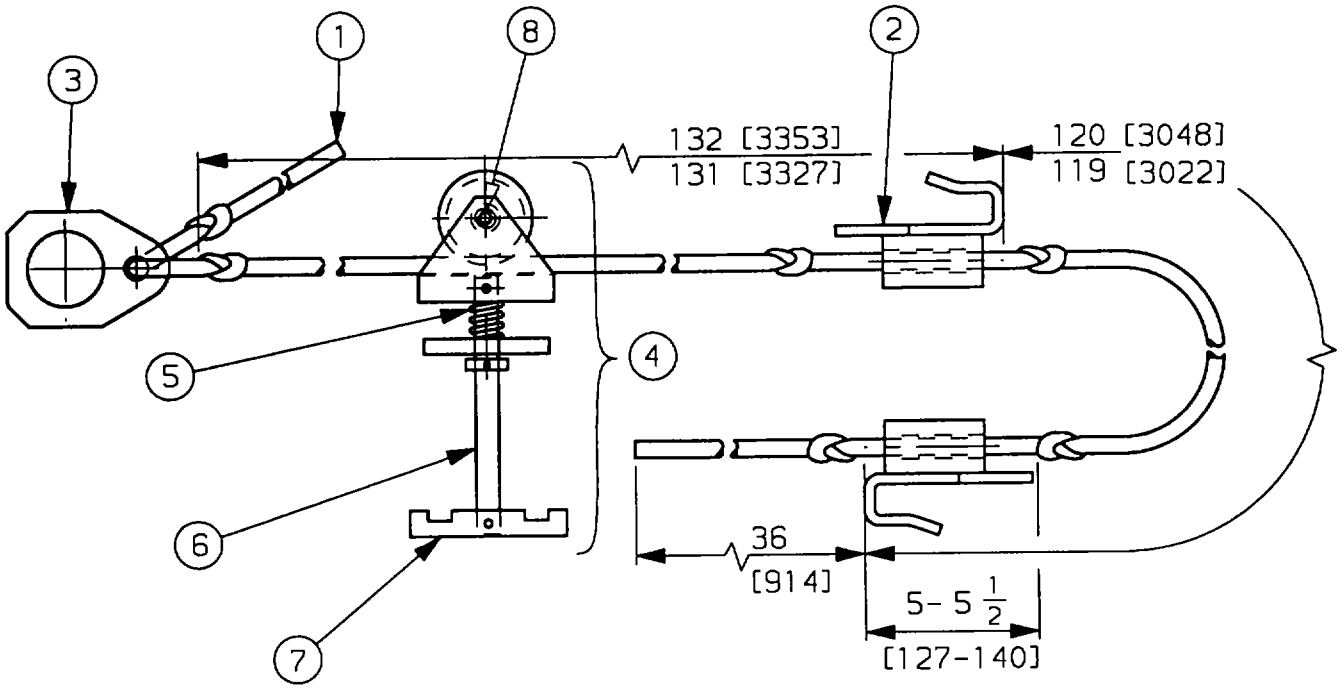
Light tackle laid on a bench.

a. Inspection

(1) Examine rope (1) for chafing and wear, particularly where it passes through hook assemblies (2), plate (3) and toggle bar assembly (4).
(2) Examine plate (3) and hook assemblies (2) for damage and distortion.
(3) Check tension in toggle bar spring (5), and check for damage/distortion on spindle (6) and foot (7).

b. Removal/Installation

(1) If rope is undamaged and hook or plate needs replacing, undo knots, remove damaged item, replace with new and re-tighten knots in original positions.
(2) If rope needs replacement, obtain new length of rope, tie a knot in one end, same distance as old rope then mark position of other components and knots and cut them free from old rope, re-threading them on new rope in same approx. positions secured with knots.
(3) If toggle bar assembly (4) needs replacing, drive out spring pin (8) securing pulley wheel and remove assembly from rope.
(4) Fit new toggle bar assembly (4), position pulley wheel and secure in place on rope with spring pin (8).



ALL DIMENSIONS IN INCHES (mm)

2-39 POST TENSIONING ASSEMBLY, GUIDE

This task covers:

a. Inspection **b. Removal** **c. Installation**

INITIAL SETUP:

Tools Required

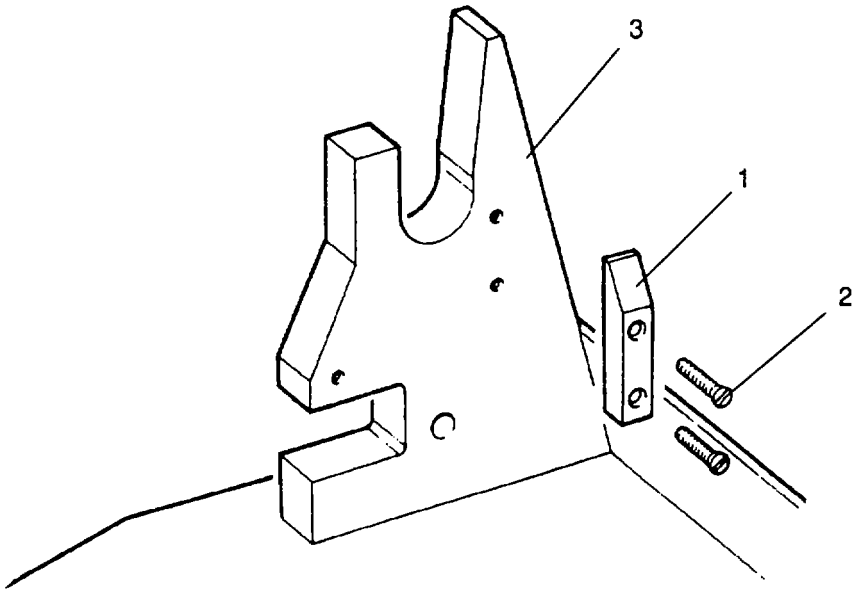
Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Materials Required

Jointing compound, (6, Appendix C)
Thread locking compound (4, Appendix C)

Equipment Conditions

Guide plate on post tensioning assembly
Post tensioning assembly on raised, flat surface



a. Inspection

(1) Inspect guide (1) for burrs, wear and damage.
(2) Remove any burrs with a flat file or replace with new if badly damaged.

b. Removal

(1) Unscrew and remove two countersunk screws (2) securing guide (1) to guide plate (3).
(2) Remove guide (1) from guide plate.

c. Installation

(1) Cover mating surfaces of new guide (1) with jointing compound.
(2) Apply thread locking compound to threads of screws (2).
(3) Secure guide (1) to guide plate (3) with screws (2).

2-40. POST TENSIONING ASSEMBLY, CATCH ASSEMBLY

This task covers:

a. Inspection **b. Removal** **c.. Installation**

INITIAL SETUP:

Tools Required

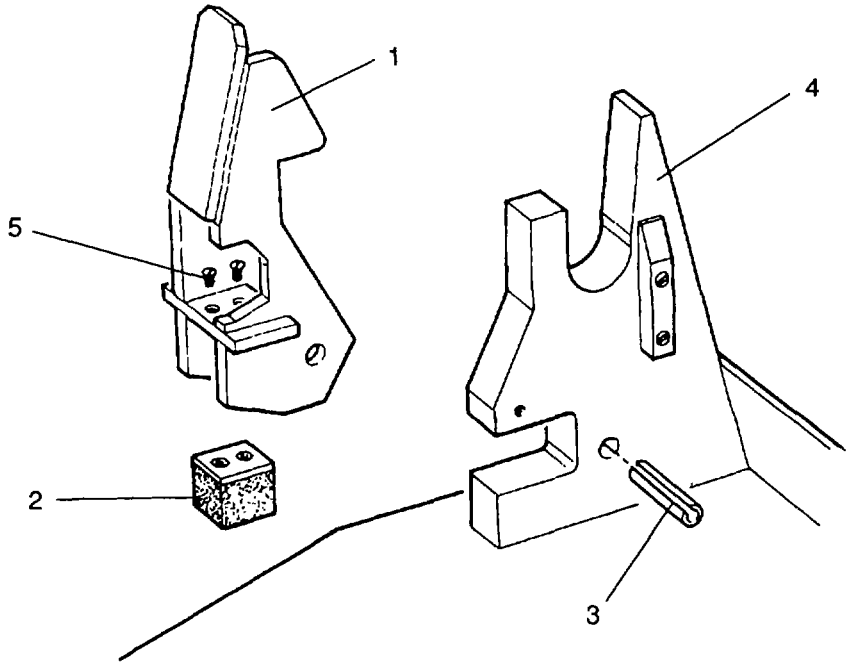
Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Materials Required

Jointing compound (6, Appendix C)

Equipment Conditions

Catch assembly on post tensioning assembly. Post tensioning assembly on raised, flat surface



a. Inspection

(1) Inspect catch assembly (1) for burrs, damage and distortion. Remove any small burrs with a flat file or replace with new catch assembly if badly damaged.
(2) Inspect rubber block (2) for cracking and wear, replace with new rubber if badly worn.

b. Removal

(1) Tap out spring pin (3) then remove catch assembly (1) from post (4).
(2) Remove two countersunk screws (5), then remove rubber block (2).
(3) Remove old jointing compound from rubber block (2) and catch assembly (1).

c. Installation

(1) Smear jointing compound on plate of rubber block (2).
(2) Install rubber block (2) in catch assembly (1), and secure with two countersunk screws (5).
(3) Position catch assembly (1) on post (4), then tap in spring pin (3).
(4) Check that catch assembly pivots freely.

2-41. POST TENSIONING ASSEMBLY, LEVER ASSEMBLY

This task covers:
a. Removal **b. Inspection** **c. Installation**

INITIAL SETUP:

Tools Required

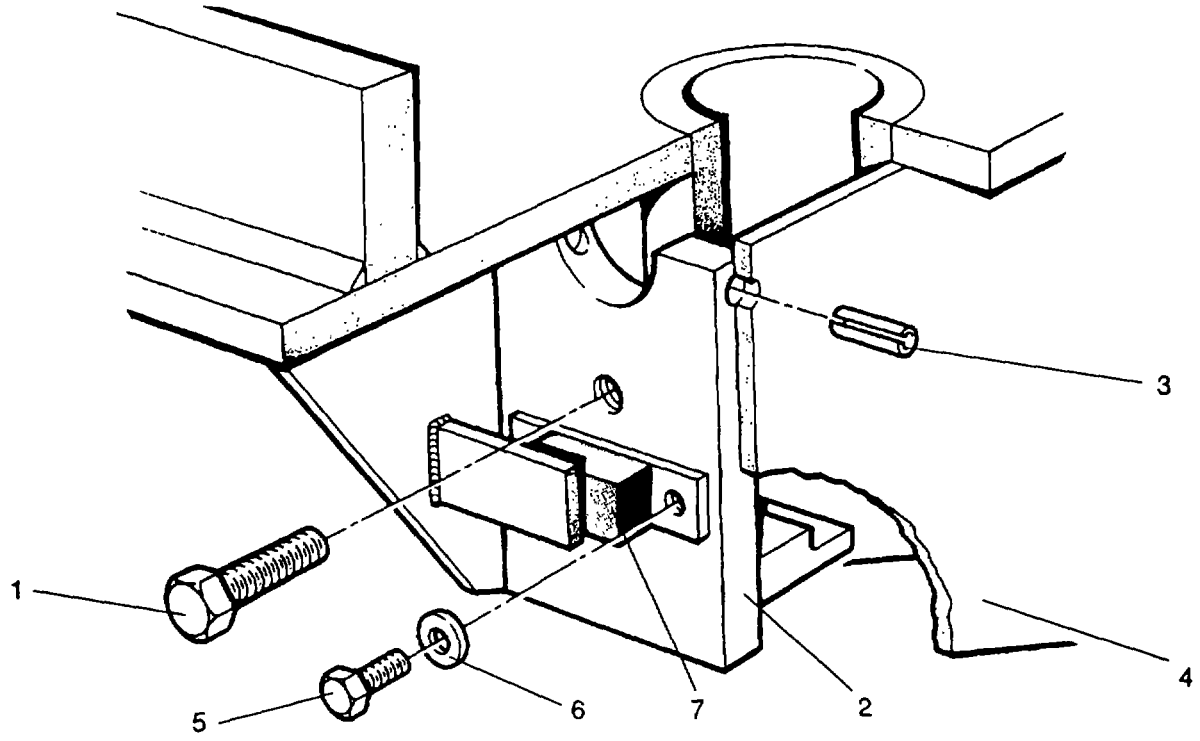
Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Materials Required

Thread locking compound (4, Appendix C)
Jointing compound (6, Appendix C)

Equipment Conditions

Lever assembly on post tensioning assembly. Post tensioning assembly on raised, flat surface, with pulley removed.



2-108

a. Removal

(1) Unscrew and remove hexagon screw (1) from lever (2) and clean off all traces of thread locking compound.
(2) Tap out both spring pins (3) securing lever to post tensioning assembly (4), then remove lever (2) from post (4).
(3) Remove two hexagon head screws (5) and washers (6) then remove lever rubber (7) from lever (2).
(4) Remove old jointing compound from lever (2) and lever rubber (7).

b. Inspection

(1) Inspect lever (2) for damage/distortion, replace with new if necessary.
(2) Inspect rubber block (7) for cracking and wear, replace with new rubber if badly worn.

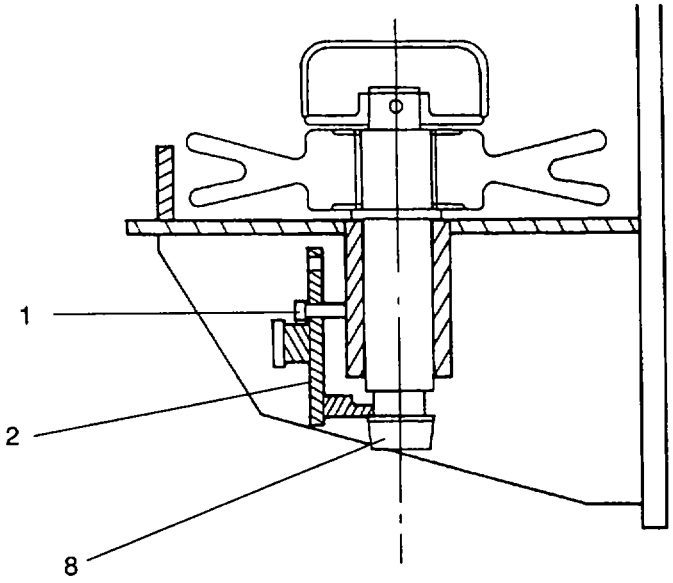
c. Installation

(1) Smear jointing compound on plate of lever rubber (7).
(2) Position lever rubber (7) on lever (2), then secure with two hexagon head screws (5) and washers (6).
(3) Position lever (2) on post (4), then tap in spring pins (3).
(4) Check that lever pivots freely.

NOTE
Coat threads of hexagon screw (1) with thread locking compound.

(5) Position lever (2) on post (4) with hexagon screw (1).
(6) Adjust screw (1) until toe of lever (2) just touches pulley shaft (8).
(7) Pull back on bottom of lever to ensure it operates correctly and allows pulley to be removed.

NOTE
Pulley will have to be fitted to check the above operation.



2-42. POST TENSIONING ASSEMBLY, DISASSEMBLY/ASSEMBLY

This task covers:

a. Disassembly **b. Inspection/Service** **c. Assembly**

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
Lifting equipment
Trestles

Materials Required

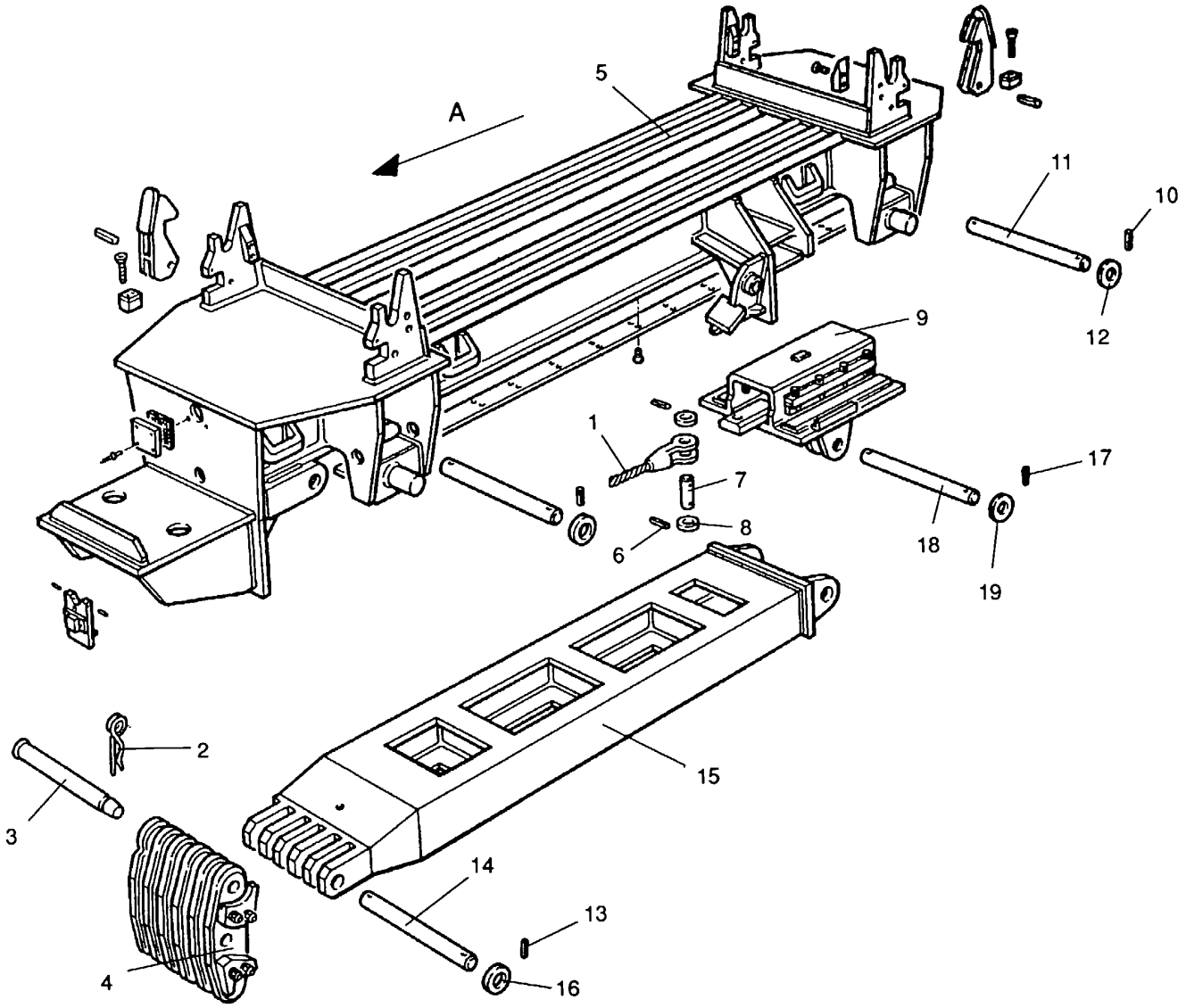
Clean cloths
Cleaning solvent (3, Appendix C)

Equipment Conditions

Post tensioning assembly standing on trestles.

a. Disassembly

(1) If necessary release tension in wire rope assembly (1) by operating puller (TM 5-5420-212-10-1).
(2) Remove panel pin clip (2) from launching nose pin (3),then remove launching nose pin from junction block (4) and frame (5).
(3) Remove spring pin (6) from pin (7) collecting washers (8).
(4) Remove pin (7) from wire rope assembly (1) and sliding block (9). It may be necessary to raise pulley end of frame (5) to allow access.
(5) Remove spring pin (10) from headless pin (11) then remove headless pin (11) from frame (5) collecting washers (12).
(6) Support frame (5) on crane.
(7) Take weight of frame (5) on crane, then remove frame in direction of arrow (A) from sliding block (9) and lower onto wooden blocks.
(8) Remove spring pins (13) from headless pin (14).
(9) Withdraw headless pin (14) from junction block (4) and reinforcing post (15), collecting washers (16).
(10) Remove spring pins (17) from headless pin (18).
(11) Support sliding block (9) and withdraw headless pin (18), collecting washer (19).
(12) Lift sliding block (9) onto bench.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WARNING

Cleaning solvent is toxic and flammable. Use only in well ventilated area and avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts and avoid skin contact.

(13) Clean all parts to remove all dirt, rocks or grease.

b. Inspection/Service

(1) Inspect frame (5) for burrs and gouges. Remove any burrs with a small flat file.
(2) Inspect reinforcing post (15) for burrs, gouges and distortion. Remove any small burrs with a flat file. If any damage is found, discard and replace with new post.
(3) Inspect junction block (4) for burrs, gouges and damage with particular reference to jaws. Remove any burrs or gouges with a flat file. If any damage is found, replace with new block.

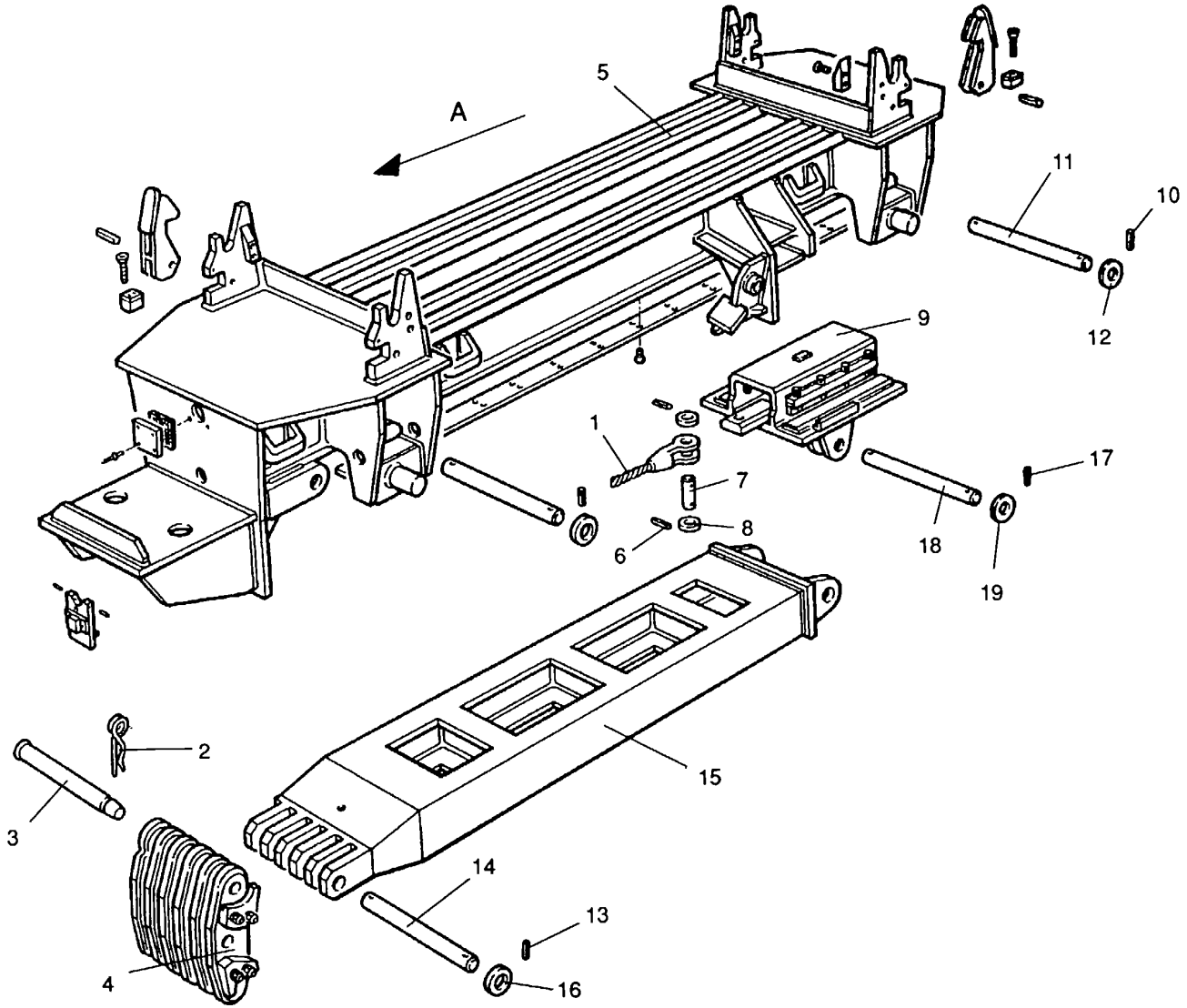
c. Assembly

(1) Support reinforcing post (15) on trestles, then line up holes of sliding block (9) and post (15).
(2) Replace pin (18) and washers (19) fitting spring pins (17).
(3) Line up holes on junction block (4) and reinforcing post (15), then replace pin (14), washers (16) and spring pins (13).

CAUTION

Take care that leading edge on frame (5) does not damage Polytetrafluoroethylene (PTFE) coating on sliding block bearing pad (9).

(4) Support frame (5) on crane and position it over reinforcing post (15) and slide onto sliding block (9).
(5) Slide headless pin (11) into position with washers (12) and fit spring pins (10).
(6) Align holes in cleat of wire rope assembly (1) and sliding block (9), then fit pin (7), washers (8) and secure with spring pins (6). It may be necessary to raise pulley end of frame (5) to allow access.
(7) Align holes of junction block (4) with mating holes in frame (5), then refit launching nose pin (3) and secure with retaining clip (2).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2-43. POST TENSIONING ASSEMBLY, BEARING STRIP

This task covers:
a. Inspection **b. Removal** **c. Installation**

INITIAL SETUP:

Tools Required

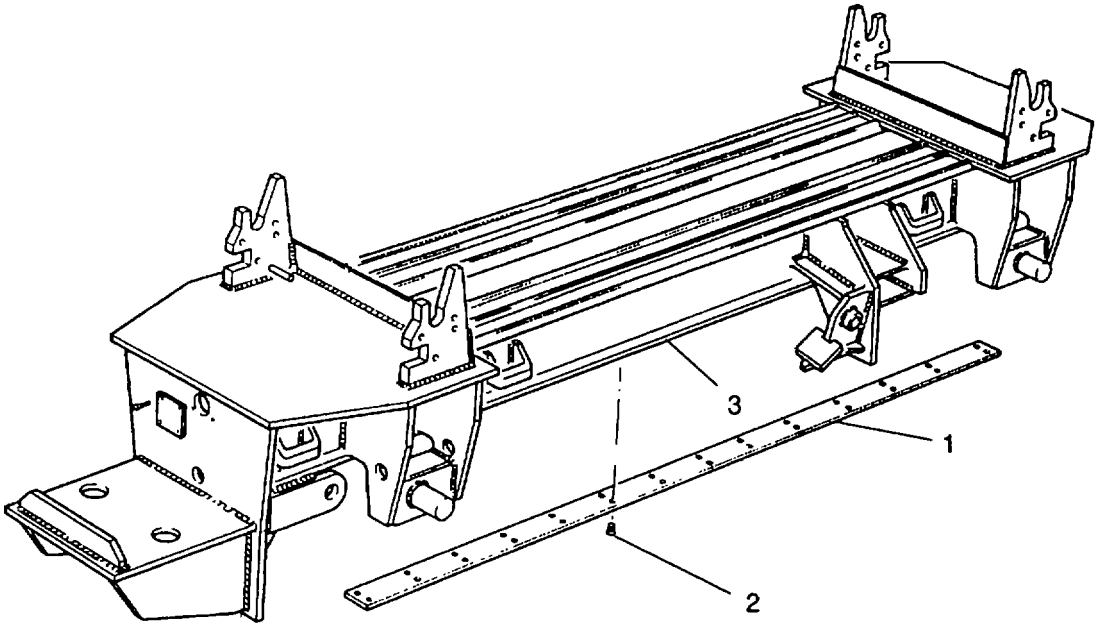
Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
Impact wrench (6, Appendix B, Section III)

Materials Required

Epoxy Resin (7, Appendix C)
Thread locking compound (4, Appendix C)
Clean cloths
Cleaning solvent (3, Appendix C)

Equipment Conditions

Bearing strip on post tensioning assembly
Sliding block removed from post tensioning assembly frame, (para. 2-42)
Post tensioning assembly removed from bridge or pallet
Post tensioning assembly on raised, flat surface, upside down



a. Inspection

(1) Inspect strip (1) for damage, scoring or rippling, replace with new strip if any of these faults are evident.
(2) Bearing strips must be replaced in pairs, even if only one strip shows signs of damage.

b. Removal

(1) With impact wrench, remove the countersunk screws (2) which secure strip (1) to frame (3).
(2) Remove strip (1) from frame (3).

WARNING

Cleaning solvent is toxic and flammable. Use only in well ventilated area and avoid prolonged breathing of fumes. Keep solvent away from flames. Do not usein excessive amounts and avoid skin contact.

(3) Remove epoxy resin from frame surface with cleaning solvent. Dry off area with a clean, dry cloth.

NOTE

If damage is present on strip take particular note when Inspecting sliding block bearing surfaces (para. 2-44).

c. Installation

(1) Apply new coat of epoxy resin to post surface.
(2) Apply thread locking compound to screws (2).
(3) Position strip (1) on frame and align screw holes.
(4) Insert screws (2) and tighten evenly.
(5) Remove surplus epoxy resin from surfaces with a clean cloth moistened in solvent.

2-44. POST TENSIONING ASSEMBLY, SLIDING BLOCK BEARING PAD ASSEMBLY

This task covers:

a. Inspection **b. Removal** **c. Installation**

INITIAL SETUP:

Tools Required

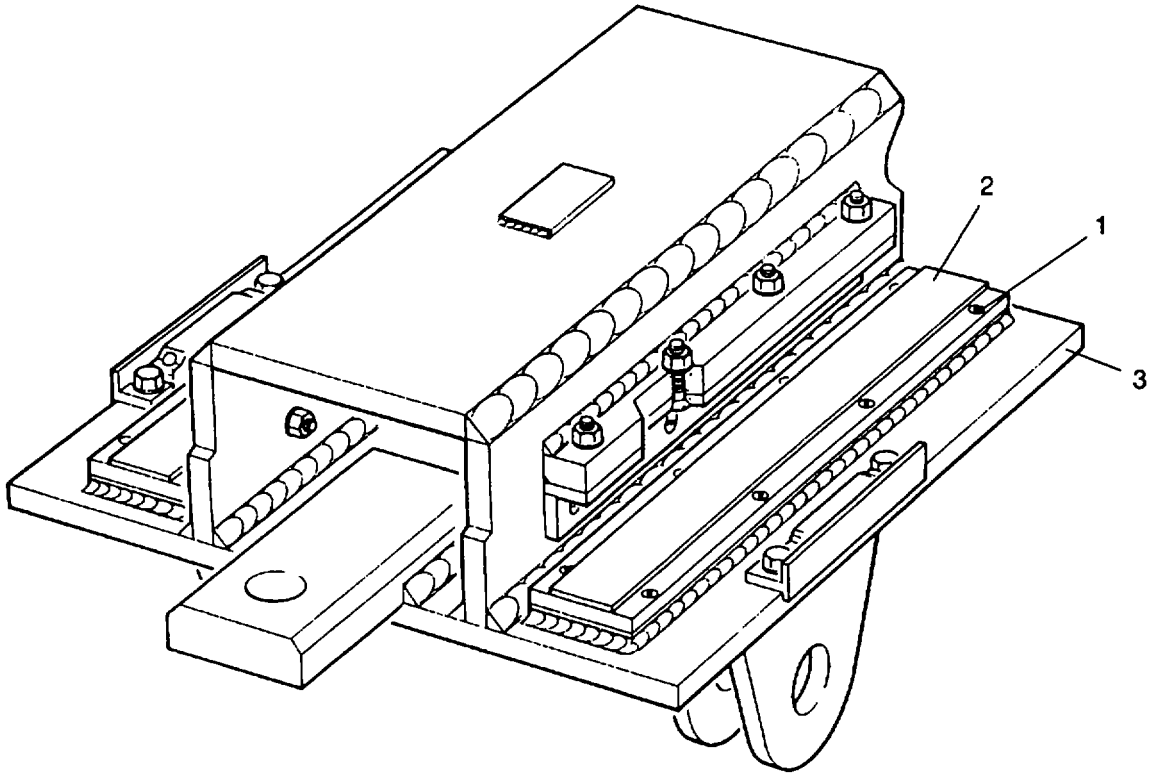
Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
Impact wrench (6, Appendix B, Section III)

Materials Required

Jointing compound, (6, Appendix C)
Thread locking compound (4, Appendix C)

Equipment Conditions

Sliding block removed from post tensioning assembly frame (para. 2-42) and placed on raised, flat surface.



a. Inspection

(1) Inspect bearing pad (2) to ensure there is PTFE on bearing pad surface, and for signs of gouging and wear. Wear is indicated by the bronze substrate being revealed where the PTFE is worn.
(2) If there is no PTFE present or damage has occurred, replace with new bearing pad. Bearing pads must be replaced in pairs.

b. Removal

(1) Using impact wrench, unscrew and remove the countersunk screws (1) securing bearing pad (2) to sliding block (3).
(2) Remove bearing pad (2) from sliding block (3).
(3) Remove all traces of jointing compound from bearing pad (2)and sliding block (3).

c. Installation

(1) Apply jointing compound to one of mating surfaces of sliding block (3) or new bearing pad (2).
(2 Position bearing pad (2) on sliding block (3).
(3) Coat screw threads with thread locking compound.
(4) Insert screws (1) and tighten evenly.

2-45. POST TENSIONING ASSEMBLY, SLIDING BLOCK BEARING STRIP

This task covers:

a. INSERT FUNCTION b. INSERT FUNCTION d. INSERT FUNCTION

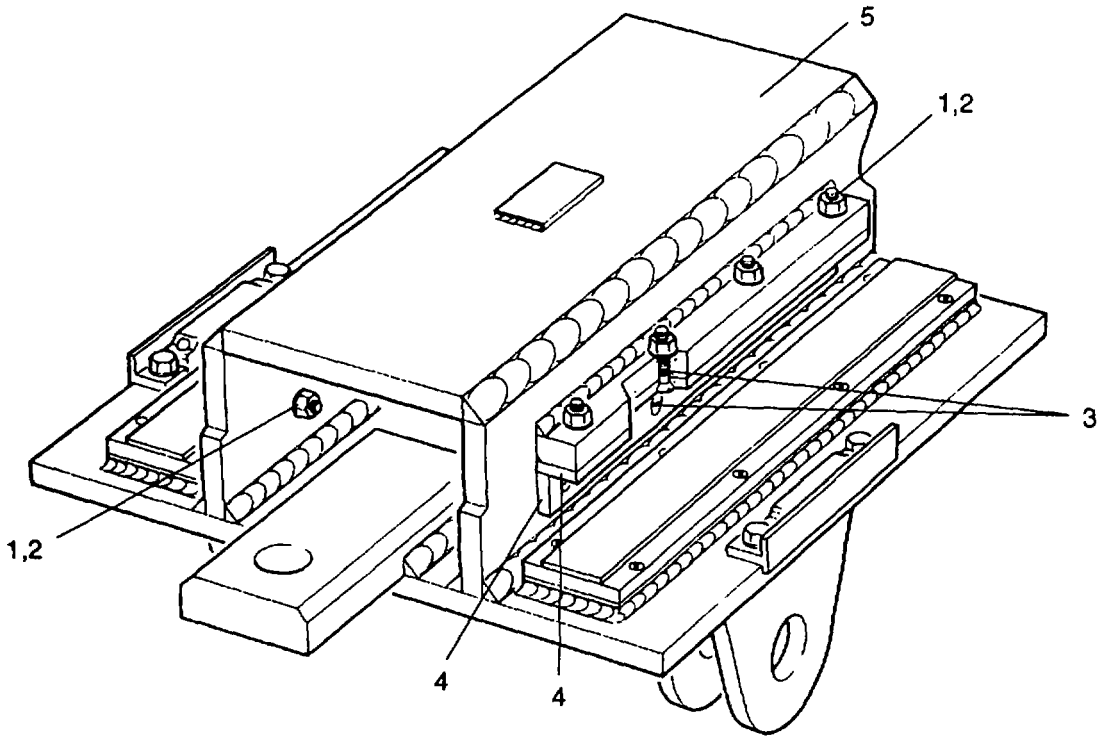
INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Equipment Conditions

Sliding block removed from post tensioning assembly frame (para. 2-42) and placed on raised, flat surface.



a. Inspection

(1) Inspect nylon bearing strips (4) for gouging and wear.
(2) If this is evident, replace with new strips on both sides of sliding block.

b. Removal

(1) Unscrew and remove the eight stiffnuts (1), washers (2) and screws (3) securing bearing strips (4) to sliding block (5).

(2) Remove bearing strips (4) from sliding block (5).
(3) Repeat this procedure on the other side.

c. Installation

(1) Secure new bearing strips (4) to sliding block (5) with eight screws (3), plain washers (2) and stiffnuts (1).
(2) Repeat this procedure on the other side.

2-46. POST TENSIONING ASSEMBLY, SLIDING BLOCK BETALIGHT

This task covers:

a. Inspection **b. Removal** **c. Installation**

INITIAL SETUP:

Tools Required

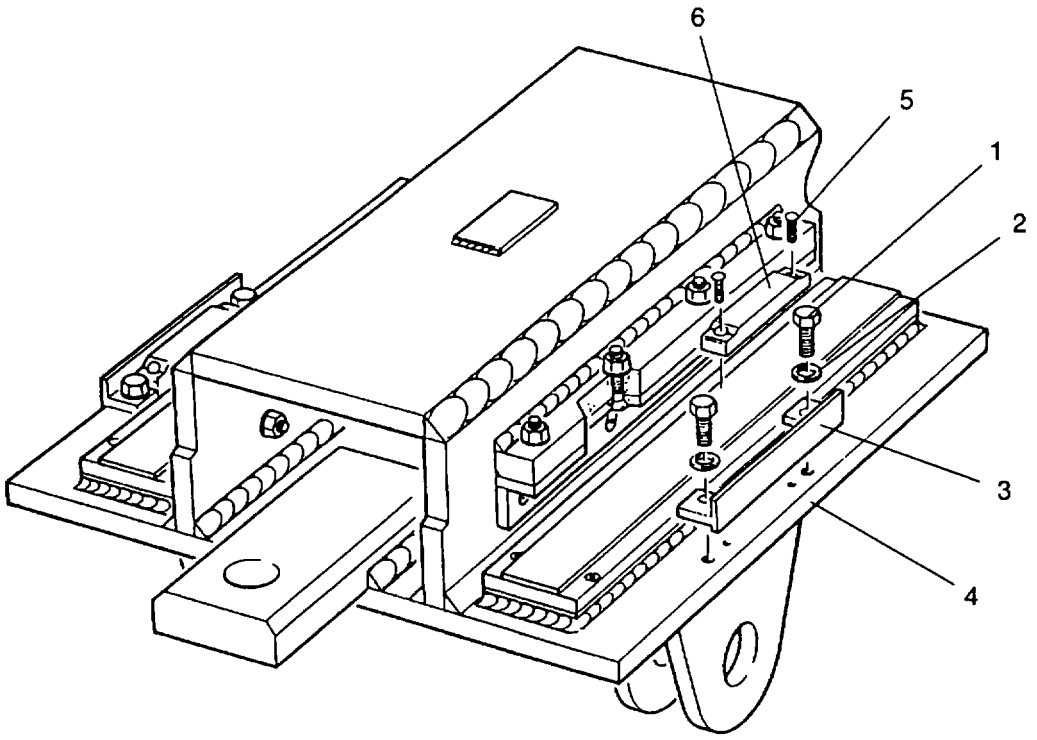
Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Materials Required

Thread locking compound (4, Appendix C)
Clean cloths
Cleaning solvent (3, Appendix C)

Equipment Conditions

Sliding block removed from post tensioning assembly frame (para. 2-42) and placed on raised, flat surface.



WARNING

If Betalights are damaged or broken indoors, immediately open all windows and doors then vacate the room and notify your servicing Radiation and Protection Officer. All surplus, unwanted or broken Betalights must be disposed of in accordance with AR 385-11.

WARNING

Cleaning solvent is toxic and flammable. Use only in well ventilated area and avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts and avoid skin contact.

CAUTION

In the event of breakage of the light source, tritium gas is released to the atmosphere, but this will rapidly diffuse away with no health hazard. When broken Betalights are being replaced it is advisable to wear rubber gloves and to take care to avoid physical damage to the products.

NOTE

A Betalight consists of a glass capsule coated internally with a phosphor and containing the radioactive gas tritium, which emits only B3 particles (electrons). No external radiation hazard exists with sealed Betalights or products containing sealed Betalights.

a. Inspection

(1) Inspect Betalight (6); if broken, replace with new.
(2) Inspect securing bracket (3) for damage and burrs. Remove any burrs with flat file or if damaged replace with new bracket.

b. Removal

(1) Unscrew and remove the two hexagon screws (1) and washers (2) securing bracket (3) to sliding block (4), then remove bracket (3).
(2) Remove the two screws (5) securing Betalight (6) to bracket (3), then remove Betalight.
(3) Remove thread locking compound from threads of screws (1) and (5) with solvent.

c. Installation

(1) Apply thread locking compound to screws (5).
(2) Secure new Betalight (6) to bracket (3) with screws (5).
(3) Apply thread locking compound to hexagon screws (1).
(4) Secure bracket (3) to sliding block (4) with screws (1) and washers (2).

2-47 AUNCHING NOSE LINK

This task covers:
a. Inspection **b. Removal** **c. Installation**

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Materials Required

Thread locking compound (4, Appendix C)
Clean cloths
Cleaning solvent (3, Appendix C)

Equipment Conditions

Link on raised flat surface.

a. Inspection

(1) Check that spacers (1) and (2) are tight and secure on plugs (3) and (4) and that both are secure in link (5).
(2) Check the chain/washer assembly (6) for damage and rusting.
(3) Check that chain/washer assembly (6) is secured in plug (3) with split pin (7)

b. Removal

(1) Using screwdriver and vise grips, remove split pin (7) from plug (3).

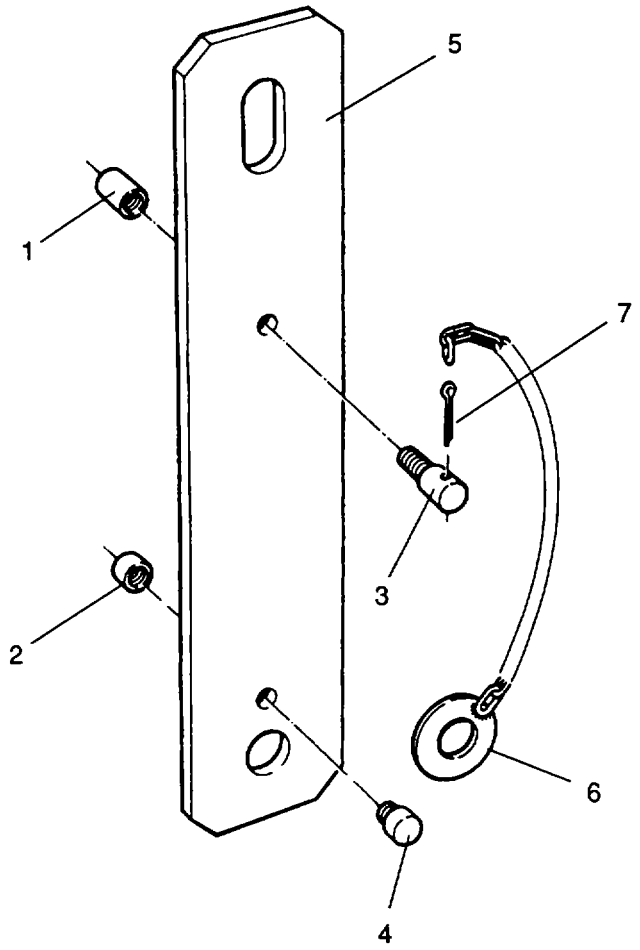
NOTE
Note position of largest plug (3)

(2) Using two pairs of vise grips unscrew spacers (1) and (2) from plugs (3) and (4).

WARNING
Cleaning solvent, is toxic and flammable. Use only in well ventilated area and avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts and avoid skin contact.

c. Service/Repair

(1) Clean threads of plugs (3) and (4) with solvent and wire brush to remove all traces of thread locking compound.
(2) Install plugs (3) and (4) in link (5) replacing any damaged parts as necessary.
(3) Apply thread locking compound to plugs (3) and (4) before screwing on spacers (1) and (2) then tighten sufficiently to prevent plugs rotating in link.
(4) Fit new split pin (7) through end of chain, then insert through plug (3) and secure by bending prongs around plug.
(5) Remove any burrs or sharp edges with flat file and patch paint where necessary to protect surf ace, in accordance with TM 43-0139, Painting Instructions for Army Materiel.



2-48. ANCHORAGE PIN

This task covers:

a. INSERT FUNCTION b. INSERT FUNCTION d. INSERT FUNCTION

INITIAL SETUP:

Tools Required

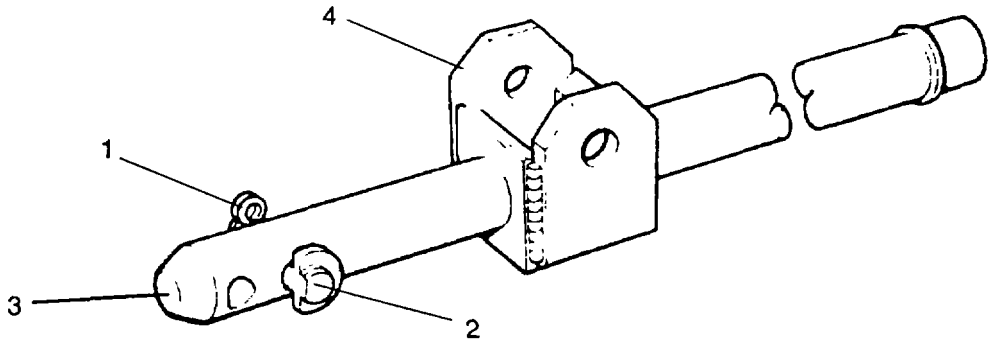
Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Materials Required

Clean cloths

Equipment Conditions

Anchorage pin on raised, flat surface.



a. Removal

(1) Remove panel pin clip (1) from retaining pin (2).
(2) Remove retaining pin from anchorage pin (3).
(3) Remove anchorage pin (3) from lug (4).

b. Installation

(1) Clean pin holes in anchorage lug (4), and wipe both pins clean.
(2) Insert anchorage pin (3) through anchorage lug (4).
(3) Clean pin hole in anchorage pin, then insert retaining pin (2).
(4) Insert panel pin clip (1) through retaining pin (2).

2-49. COPPER SULPHATE TEST

This task covers:

a. Copper Sulphating

INITIAL SETUP:

Tools Required

Paint brush

Materials Required

Copper sulphate ($CuSO_4.5H_2O$) - 20g (9, Appendix C)
Clean water - 1 pint
Glass container

NOTE

The copper sulphate test is used to determine the presence of zinc on components. The main use of this test is for checking that all the zinc coating has been removed from an area to be welded.

NOTE

Copper sulphate solution is made by dissolving 20g (approximately 3 heaped teaspoons) of copper sulphate ($CuSO_4.5H_2O$) in 1 pint (568 ml) of water. The water may be heated to aid solution of the crystals, but, if heated, the solution must be allowed to cool before use. Containers used for mixing the solution must be made of material iInert to copper solution, e.g. glass.

a. Copper sulphate can be applied to an area by brush or spraying or, if the component is small enough, the complete component may be immersed into the solution.

b. When an area is treated with the copper sulphate solution, areas which turn black are the areas which still have a zinc coating.

c. After testing for zinc coating the solution is to be washed with water and scrubbed off.

2-50. ANTI-SKID COATING

This task covers:

a. Preparation **b. Patch Painting**

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
Paint brushes
Protective gloves
Protective face mask/goggles
Shop Equipment, Common No. 1 (2, Appendix B, Section III)

Materials Required

Epoxy pitch binder EC21 BC, consisting of:
Epoxy base EC21/B and pitch curing agent EC21/C (11, Appendix C)
Fused bauxite grit (12, Appendix C)
Crocus cloth (10, Appendix C)
Stiff bristle brush (5, Appendix C)

Equipment Conditions

Component in upright position on raised flat surface.

a. Preparation

WARNING

Epoxy Pitch Binder EC21BC can cause skin irritation. Avoid contact with hands and face with both base and curing agent. Apply barrier cream to hands and exposed areas of skin, and wear protective gloves when mixing and applying. Avoid inhaling vapor - wear face mask.

NOTE

1. **Consult the Local Environmental Co-ordinator before beginning any painting operation. The use of some materials may be prohibited locally. Refer to Appendix C for data on substitutions.**

2. **Avoid painting during periods of mist, fog, rain etc., high humidity, or early In the morning, or when condensation affects the working surface. Ideal conditions are a sunny day or low humidity and temperature above 55^{o}F.**

3. **Patch painting that has to be carried out in unsatisfactory weather conditions to provide temporary protection, must be removed and re-applied when conditions are satisfactory. WHATEVER THE CONDITIONS, PAINTING SHALL BE CARRIED OUT WHENEVER IT IS NECESSARY TO PROVIDE TEMPORARY PROTECTION.**

4. **If metal surface is exposed then carry out patch painting in accordance with TM 43-0139, Painting Instructions for Army Materiel.**

(1) Remove damaged coating(s) until a sound pitch surface is reached.
(2) Roughen surface with crocus cloth.
(3) Mix epoxy base and pitch curing agent in equal parts by volume, or weight. DO NOT THIN.
(4) Only mix sufficient for requirements. Pot life of mix is approximately 3 to 4 hours at 68^{o}F (200°C).

b. Patch Painting

(1) Brush apply coat of epoxy pitch at approximate rate of 4 1/2 oz/yd^2 (150 gm/m^2), and allow to air dry for approximately thirty minutes.
(2) Liberally cover epoxy pitch coating with bauxite grit using a stiff bristle brush, at an approximate rate of 3 lb/yd^2 (1500 gm/m^2), and allow coating/bauxite grit to dry for twelve hours.
(3) Lightly brush off any loose grit.
(4) Apply further coat of epoxy pitch to give a total covering of 20 oz/yd^2 (750 gm/m^2), and allow seven days to cure.
(5) Stacking is permitted during the seven day period, provided that no contact is made with the treated surface.

Section VII. PREPARATION FOR STORAGE OR SHIPMENT

2-51. SECURITY PROCEDURES

Security procedures shall be implemented in accordance with AR190-11 or AR190-13.

2-52. ADMINISTRATIVE STORAGE INSTRUCTIONS

a. Placement of equipment in administrative storage should be for short periods of time when a shortage of maintenance effort exists. Items should be in mission readiness within 24 hours or within the time factors as determined by the directing authority. During the storage period appropriate maintenance records will be kept.

b. Before placing equipment in administrative storage, current maintenance services and Equipment Serviceable Criteria (ESC) evaluations should be completed, shortcomings and deficiencies should be corrected, and all Modification Work Orders (MWO'S) should be applied.

c. Storage site selection. Inside storage is preferred for items selected for administrative storage. If inside storage is not available, trucks, vans, conex containers and other containers may be used.

2-53. PRESERVATION AND PACKING

a. Items susceptible to corrosion will be coated with a preservative compound or oil as prescribed by MIL-P-116.

b. Packing cases will be constructed in accordance with MIL-C-104. Components within packing case shall be cushioned, blocked and braced to prevent movement and chafing from adjacent items

2-54. MARKING I

Marking shall be in accordance with MIL-STD-129.

CHAPTER 3
DIRECT SUPPORT MAINTENANCE

Section I. DIRECT SUPPORT TROUBLESHOOTING

3-1. GENERAL

Table 3-1 contains malfunctions (or defects) tests/inspection and corrective actions only for those components within the scope of Direct Support Maintenance repair as authorized by the Maintenance Allocation Chart, Appendix B. The malfunctions (or defects) are followed by a list of tests or inspections to help to determine probable causes and corrective actions to take. The tests/inspections and corrective actions should be performed in the order listed.

TABLE 3-1. Direct Support Troubleshooting

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
(1) HYDRAULIC JACK 15T & 20T- NOISY PUMP (Paras. 2-26 and 2-33, 3-9 and 3-10).		
	a. Check suction valve delivery for dirt.	Clean suction valve seat and oil way.
	b. Check whether fluid has become aerated.	Replace pump plunger seal.
	c. Check for blocked filter.	Clean and flush system and refill with fresh clean fluid.
	d. Check pump for loose, worn or damaged parts.	Replace as necessary.
	e. Check for foreign body (e.g. lint or cotton waste) in system.	Clean system thoroughly.
(2) HYDRAULIC JACK 15T & 20T - IRREGULAR ACTION.		
	a. Check whether fluid has become aerated.	Replace pump plunger seal.
	b. Check whether valves have become blocked.	Clean as necessary.
	c. Check for air pockets in system.	Bleed system thoroughly; add fluid.

(3) HYDRAULIC JACK 15T & 20T- RAM WILL NOT LIFT/LOWER (paras. 2-26 and 2-33, 3-9 and 3-10).

a. Check for worm pump and internal leaks. Check pump plunger seal, pump barrel seal and spring seat on suction/delivery/release valve.
Replace as necessary.

b. Check valve seat in bottom of ram for damage/debris.
Clean and replace as necessary.

c. Check release valve
Clean and replace as necessary

(4) HYDRAULIC JACK 15T & 20T- EXTERNAL LEAKS

Check for damaged or worn seals, loose screws. Inspect ram packing, body seal, body gasket, filler cap seal, base plug and ball, suction/delivery/release valve, body screws.
Replace as necessary.

(5) HYDRAULIC JACK 15T & 20T - EXCESSIVE WEAR ON PUMP.

a. Check type of fluid.
Only type MIL-L-7870A to be used.

b. Check quality of fluid in jack.
Deteriorated fluid to be replaced and system flushed out and refilled with MIL-L-7870A.

c. Check for contaminated fluid.
Contaminated fluid to be replaced and system flushed out and refilled with MIL-L-7870A.
Clean filter.

d. Check for air pockets in system. Inspect pump plunger seal and pump barrel seal.
Bleed system and replace parts as necessary.

e. Check for lack of fluid in system.
Fill with MIL-L-7870A only.

f. Check for dirt in system.
Flush system, clean/replace filter and refill with fresh clean MIL-L-7870A.

(6) HYDRAULIC JACK 15T & 20T - RAM WILL NOT SUPPORT LOAD (paras. 2-26 and 2-33, 3-9 and 3-10).

a. Check for damaged release valve.
Clean release valve assembly. Inspect valve seatings and replace as necessary.

b. Check for worn ram packing.
Replace ram packing as necessary.

c. Check valve seat in bottom of ram for damage/debris.
Clean and replace as necessary.

(7) ROCKING ROLLER - UP/DOWN INDICATOR NOT VISIBLE (para. 3-13).

Check for bent, broken or missing indicators (spring pins).
Replace as necessary.

(8) ROCKING ROLLER - BEARING PLATE JAMMED IN LOCKED OR UNLOCKED POSITION.

Check for bent or damaged brackets, bearing plate or securing pins.
Replace as necessary.

(9) ROCKING ROLLER - BEARING PLATE WILL NOT HOLD IN LOCKED POSITION.

Check for damaged or broken plungers.
Replace as necessary.

(10) ROCKING ROLLER - WILL NOT SIT PROPERLY ON CAPSILL.

Check guide holes in base of pedestal for damage.
Remove any burrs with a round file.

(11) ROCKING ROLLER - ROLLERS WILL NOT TURN.

a. Check for damaged bearings and seals.
Replace as necessary.

b. Check for loose flanged nut (sheared spring pin).
Replace as necessary.

(12) ROCKING ROLLER - EXCESSIVE SIDE PLAY IN ROLLERS (para. 3-13).

a. Check for damaged bearings.

b. Check for loose flanged nut (sheared spring pin).
Replace as necessary.

(13) ROCKING ROLLER - ROLLERS FALL INTO LOW POSITION DURING OPERATION.

a. Check indicator pins point in correct position.
Reassemble shaft assemblies as necessary.

b. Check correct orientation of shaft assemblies in frame.
Reassemble shaft assemblies as necessary.

(14) ROCKING ROLLER - INDICATOR PINS POINT IN WRONG DIRECTION WHEN ROLLERS ARE UP OR DOWN.

Check correct orientation of shaft assemblies in frame.
Reassemble as necessary.

(15) ROCKING ROLLER - FRAME NOT SQUARE WITH PEDESTAL.

Check for damaged or distorted rubber pads.
Replace as necessary.

(16) ROLLER BEAM ROLLERS - EXCESSIVE SIDE PLAY (paras. 2-25, 3-6 and 3-7)

a. Check Mk 2 rollers are fitted, identified by two concentric grooves on end face.
Replace as necessary.

b. For plain rollers check that outer spacer is fitted.
Overhaul rollers.

c. Check flanged nut is secure (sheared spring pin).
Replace as necessary.

Section II. DIRECT SUPPORT MAINTENANCE PROCEDURES

CAUTION

MGB primary components are highly stressed and early detection of crack damage is most Important. Delay in detection of cracks may result In complete failure of a component.

NOTE

During inspections, pay particular attention to all welds, top and bottom chords of highly stressed components and all connectors and lugs.

TASK	PROCEDURE	PAGE NO.
3-2	Pallet Adapter	3-6
3-3	Push Bar Adapter, Brackets	3-10
3-4	Panel Erection Aid	3-12
3-5	Push Bars Short, Long, End Fittings	3-16
3-7	Roller Beam, Plain Roller Assembly	3-25
3-6	Roller Beam, Flanged Roller Assembly	3-25
3-8	Launching Nose Cross Girder, Roller Assembly	3-27
3-9	Hydraulic Jack 15T	3-29
3-10	Hydraulic Jack 20T	3-42
3-11	Landing Roller	3-56
3-12	Launching Nose Roller, Roller Assembly	3-58
3-13	Rocking Roller, Overhaul	3-60

3-2. PALLET ADAPTER

This task covers:

a. Cleaning **b. Inspection** **c. Repair**

INITIAL SETUP:

Tools Required

Shop Equipment, Supplemental No.1 (3, Appendix B, Section III)
Shop Equipment, Common No.1 (2, Appendix B, Section III)
Chipping hammer (7, Appendix B, Section III)
Standard C- clamp, 8 inch (8, Appendix B, Section III)

Materials Required

Pre-Treatment-Primer, (14, Appendix C)
Primer Paint, (15, Appendix C)
Finish Paint, (16,17, Appendix C)
Sealing Compound, Boscoprene (13, Appendix C)

Equipment Conditions

Adapter removed from trailer and placed on raised, flat surface.

a. Cleaning

(1) Remove any dirt, grease or other foreign matter from damaged area or welds.
(2) Remove any flaking paint.

b. Inspection

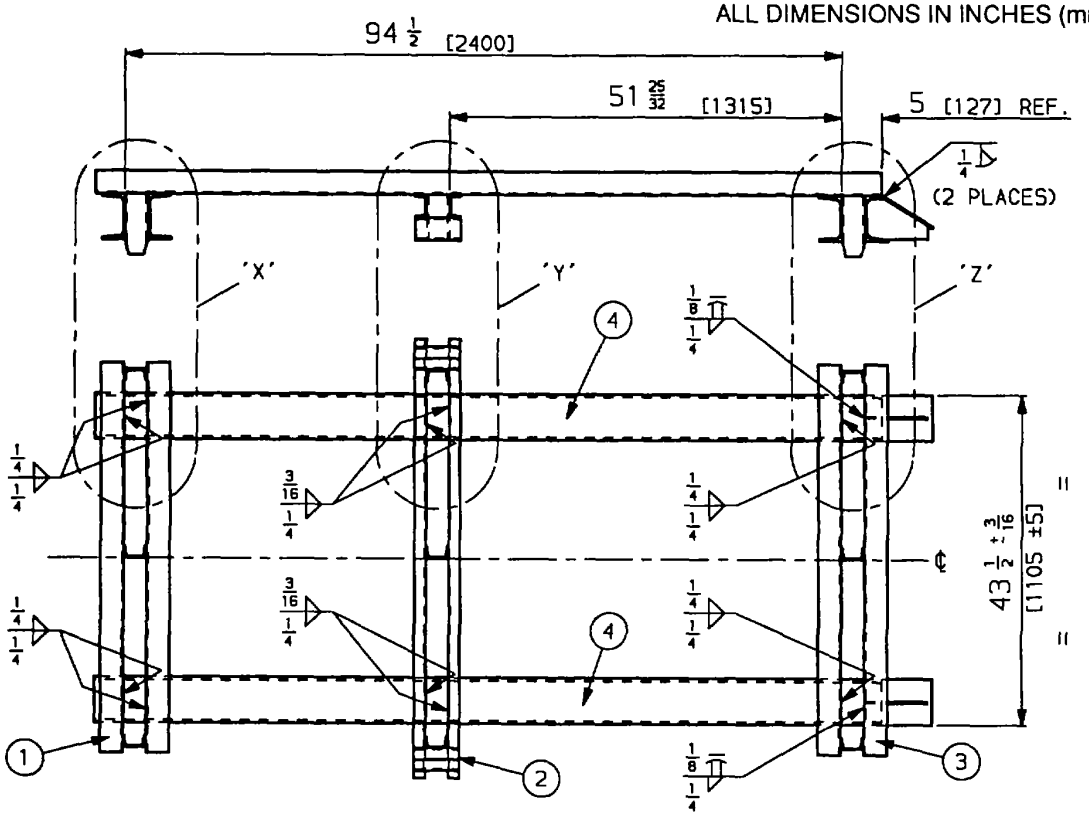
(1) Carry out a thorough visual inspection to determine extent of damage.
(2) Check for bent or distorted channels and plates, and cracked welds.

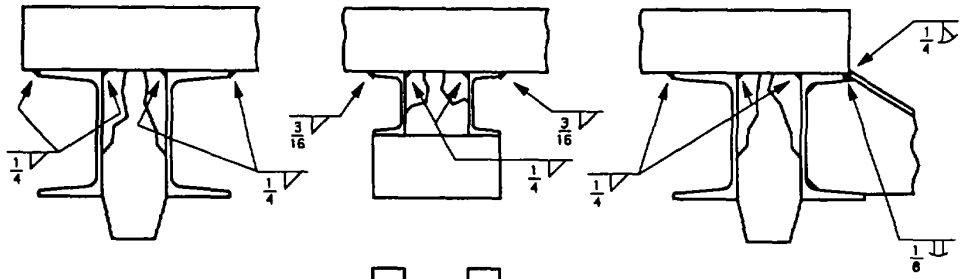
c. Repair

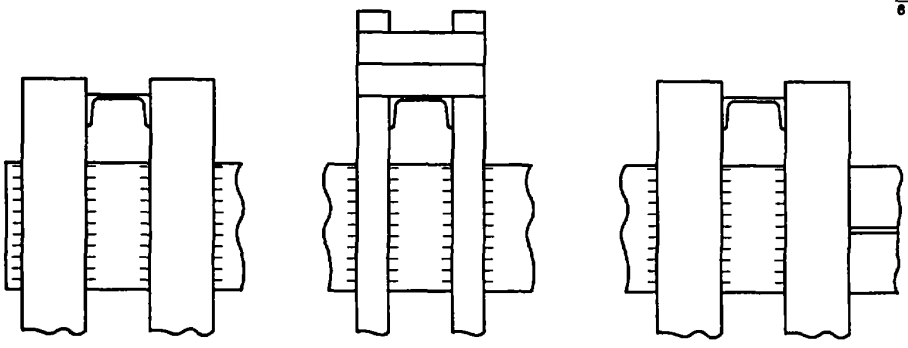
WARNING

Wear protective eye goggles when chipping or grinding. Failure to do so can result in eye injuries and loss of sight.

ALL DIMENSIONS IN INCHES (mm)







VIEW WITHIN 'X'
SHOWING WELDS
TYPICAL 2 PLACES

VIEW WITHIN 'Y'
SHOWING WELDS
TYPICAL 2 PLACES

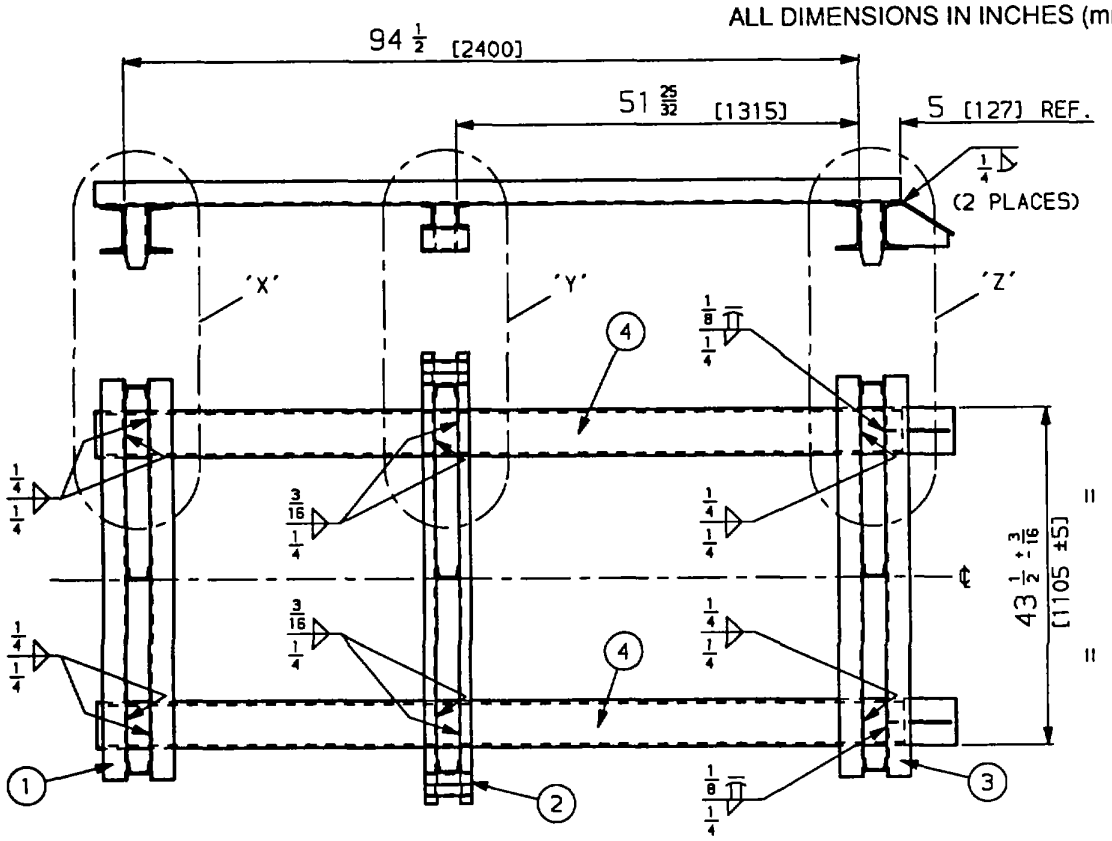
VIEW WITHIN 'Z'
SHOWING WELDS
TYPICAL 2 PLACES

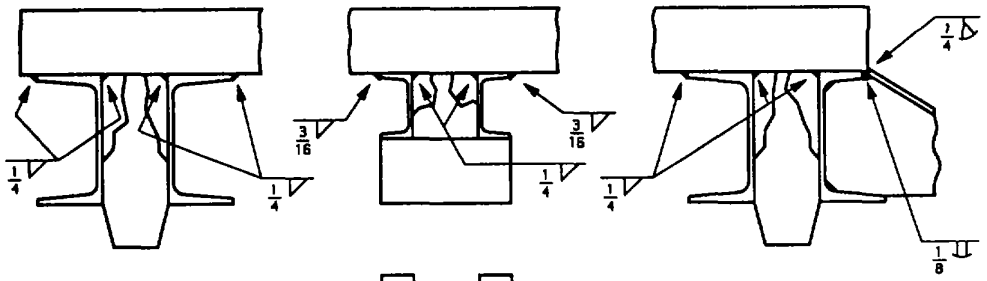
(1) Cracked or damaged welds.
   (a) Remove cracked or damaged welds by grinding or chipping.
   (b) Apply fillet welds maintaining dimensions as shown. See Appendix E for weld procedures.
   (c) Closely inspect weld. Any cracks shall be chipped out and re-welded.
   (d) Clean surfaces, apply pre-treatment, primer and finish paint in accordance with TM 43-0139.
   (e) Seal unwelded edges with sealing compound.

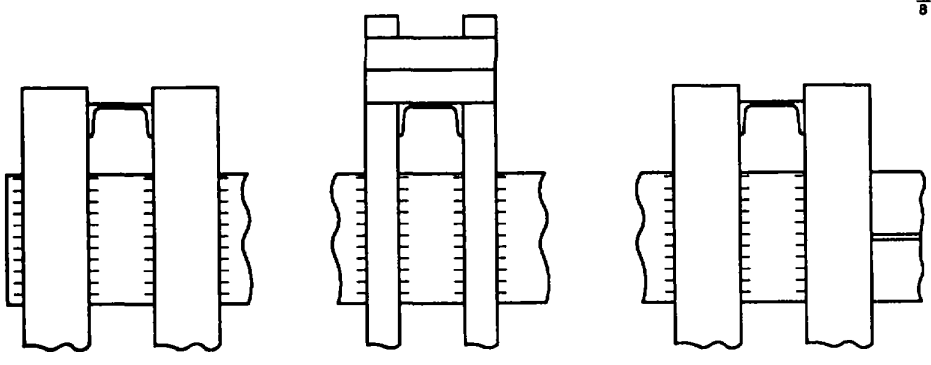
(2) To replace assembly (1):
   (a) Remove welds by grinding or chipping. Take care not to damage parent metal.
   (b) Remove the assembly (1).
   (c) Mark up new assembly (1) and channel sections (4) to dimensions shown.
   (d) Clamp assembly to channel sections, and tack weld.
   (e) Complete welding maintaining dimensions as shown. See Appendix E for weld procedures.
   (f) Closely inspect all welds. Any cracks shall be chipped out and rewelded.
   (g) Clean surfaces in preparation for protective finish.
   (h) Apply pre-treatment, primer and finish paint in accordance with TM 43-0139, except for holes which must be free of any coating or paint.

(3) To replace items 2, 3 or 4 carry out procedure as in step (2) above.

ALL DIMENSIONS IN INCHES (mm)







VIEW WITHIN 'X'
SHOWING WELDS
TYPICAL 2 PLACES

VIEW WITHIN 'Y'
SHOWING WELDS
TYPICAL 2 PLACES

VIEW WITHIN 'Z'
SHOWING WELDS
TYPICAL 2 PLACES

3-3. PUSH BAR ADAPTER, BRACKETS

This task covers:

a. Cleaning **b. Inspection** **c. Repair**

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanics, Automotive (GMTK) (1, Appendix B, Section III)
Shop Equipment, Supplemental No.1 (3, Appendix B, Section III)
Shop Equipment, Common No.1 (2, Appendix B, Section III)
Standard C-clamp, 8 inch (8, Appendix B, Section III)

Materials Required

Pre-Treatment Primer, (14, Appendix C)
Primer Paint, (15, Appendix C)
Finish Paint, (16 and 17 Appendix C)
Sealing Compound, Boscoprene (13, Appendix C)

Equipment Conditions

Push bar removed from truck or pallet and placed on raised, flat surface.

a. Cleaning

(1) Remove any dirt, grease or other foreign matter from damaged area or welds.
(2) Remove any flaking paint.

b. Inspection

(1) Carry out a thorough visual inspection to determine extent of damage.
(2) Check for bent or distorted channels and plates, and cracked welds.

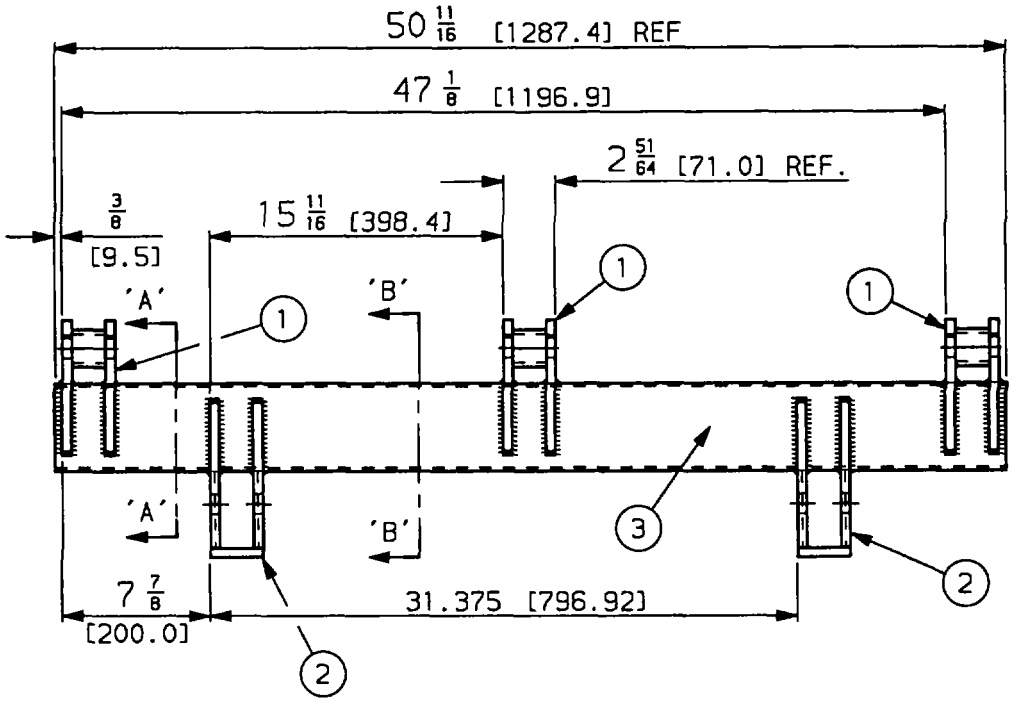
c. Repair

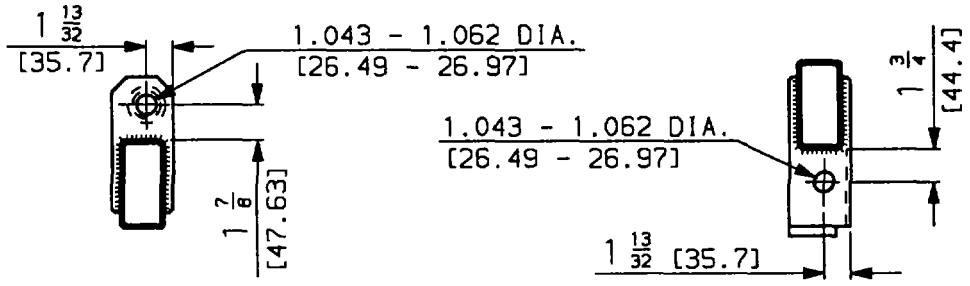
WARNING

Wear protective eye goggles when chipping or grinding. Failure to do so can result in eye injuries and loss of sight.

(1) Cracked or damaged welds
  (a) Remove cracked or damaged welds by grinding or chipping.
  (b) Apply fillet welds maintaining dimensions as shown. See Appendix E for weld procedures.
  (c) Closely inspect weld and carry out dye penetrant test. Any cracks shall be chipped out and rewelded.
  (d) Clean surfaces, apply pre-treatment, primer and finish paint.
  (e) Seal unwelded edges with sealing compound.

(2) To replace brackets (1) and (2).
  (a) Remove welds by grinding or chipping. Take care not to damage parent metal.
  (b) Remove bracket (1) or (2).
  (c) Mark up new brackets (1), (2) and mark out bar (3) to dimensions shown.
  (d) Clamp bracket in position and tack weld.
  (e) Complete welding maintaining dimensions as shown. See Appendix E for weld procedures.
  (f) Closely inspect all welds and carry out dye penetrant test. Any cracks shall be chipped out and rewelded.
  (g) Clean surfaces in preparation for protective finish.
  (h) Apply pre-treatment, primer and finish paint in accordance with TM 43-0139, except for holes which must be free of any coating or paint.





SECTION 'A'-'A'
TYPICAL 3 PLACES

SECTION 'B'-'B'
TYPICAL 2 PLACES

NOTE:-
ALL FILLET WELDS 3/16 [4.76]
UNLESS OTHERWISE STATED.

ALL DIMENSIONS IN INCHES (mm)

3-4. PANEL ERECTION AID

This task covers:
a. Inspection **b. Repair**

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)

Materials Required

Cleaning solvent (3, Appendix C)
Clean cloths
Crocus cloth (10, Appendix C)

Equipment Conditions

Panel erection aid on raised, flat surface.

a. Inspection

(1) Remove grease, dirt and all other foreign matter.

(2) Carry out a thorough visual examination to determine damage or identify faulty parts.

b. Repair

(1) Replace Locking Plate.

(a) Unscrew and remove locknuts (1) and washers (2) from bolts (3).

(b) Remove bolts (3) and spacers (4), then remove locking plate (5) from beam assembly (6).

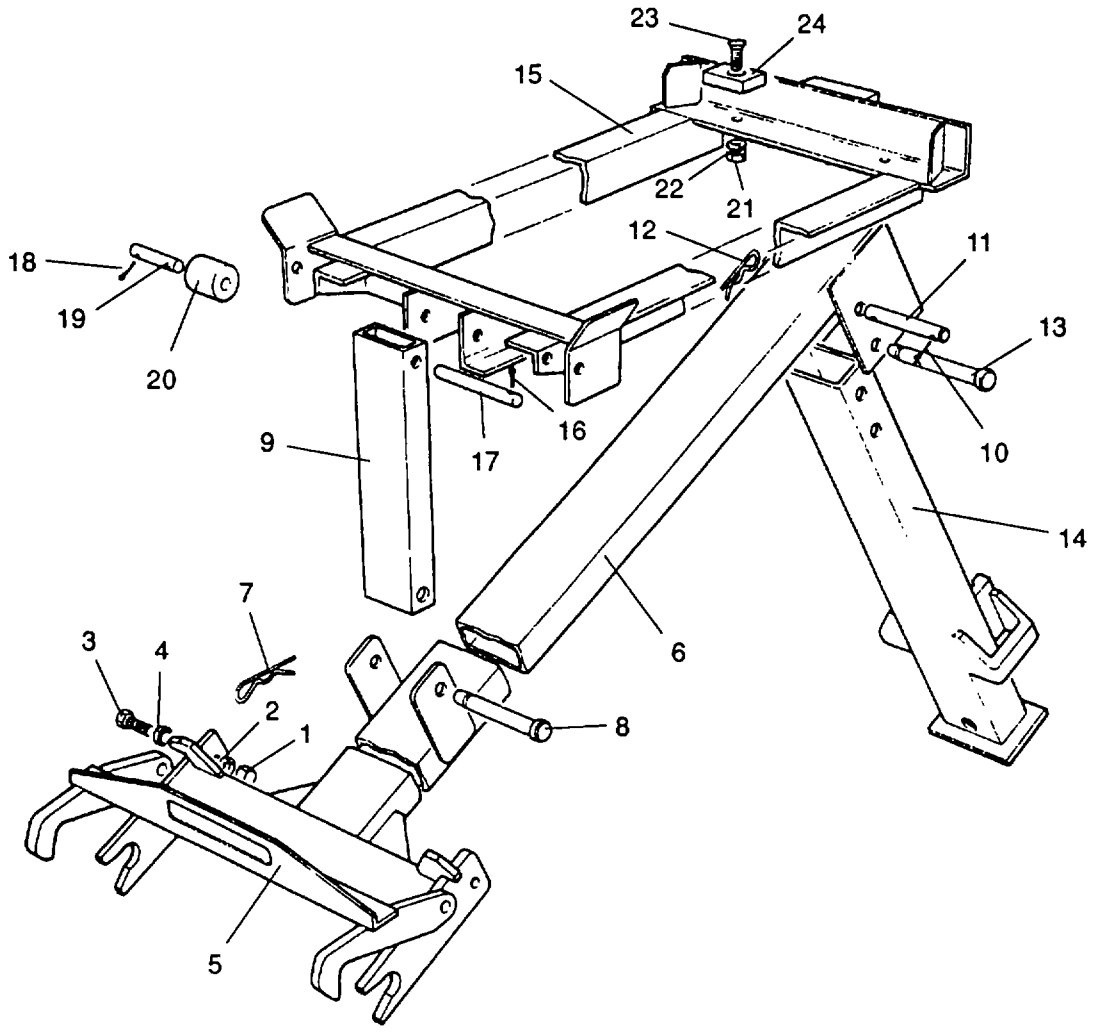
(c) Replace locknuts (1).

(d) Replace spacers (4) if worn or damaged.

(e) Replace bolts (3) if wrench faces or threads are damaged.

(f) Connect new locking plate (5) to beam assembly (6) with bolts (3) - spacers (4), locate between beam and locking plate.

(g) Assemble washers (2) and locknuts (1) on bolts (3).

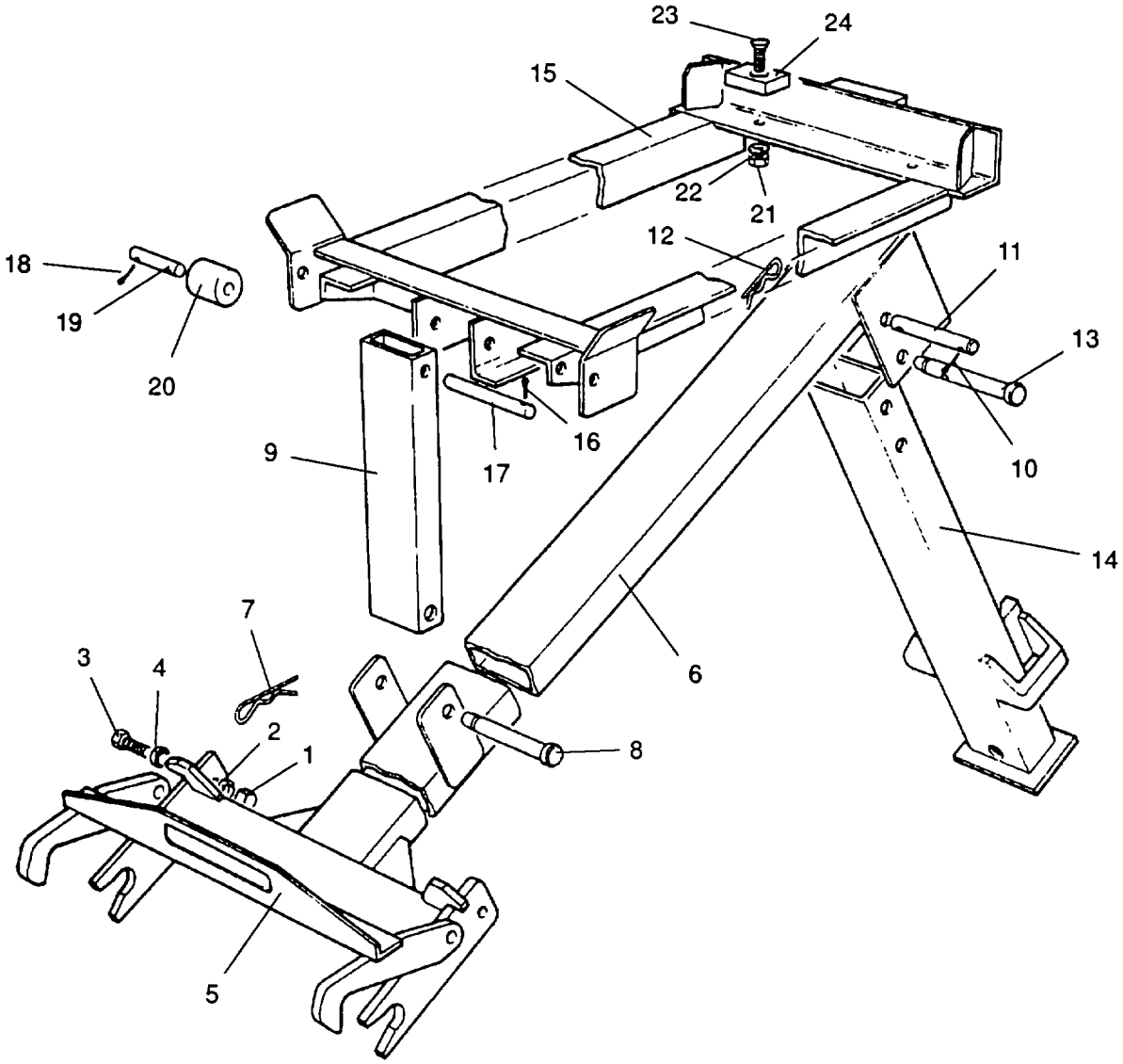


(2) Replace Beam Assembly
   (a) Remove locking plate as detailed in step (1) (a) and (b) above.
   (b) Remove panel pin clip (7) from bracing pin (8), then remove bracing pin, securing beam assembly (6) to post (9).
   (c) Remove two cotter pins (10) from headless pin (11), and panel pin clip (12) from bracing pin (13).
   (d) Remove headless pin (11), bracing pin (13), securing beam assembly (6) to post assembly (14) and frame assembly (15).
   (e) Clean bracing pins (8) and (13) and headless pin (11). Replace if damaged or bent.
   (f) Replace cotter pins (10) and locknuts (1).
   (g) Connect beam assembly (6) to frame assembly (15) and post assembly (14) with headless pin (11), then insert cotter pins (10) through ends of headless pin; bend prongs in opposite directions around pin.
   (h) Insert bracing pin (13) and secure with clip (12).
   (i) Connect post (9) to beam assembly (6) with bracing pin (8). Secure bracing pin with clip (7).
   (j) Connect locking plate (5) to beam assembly as detailed in step (1) (f) and (g) above.

(3) Replace Post Assembly (14) as detailed in step (2), (c) through (e), (g) and (h).

(4) Replace Frame Assembly
- (a) Remove cotter pins (10) from headless pin (11), then remove headless pin from beam assembly (6) and frame assembly (15).
- (b) Remove cotter pins (16) from headless pin (17), then remove headless pin from post (9) and frame assembly (15).
- (c) Clean bracing pin (17); replace if damaged or bent.
- (d) Replace cotter pins (16).
- (e) Remove cotter pins (18) from headless pins (19).
- (f) Remove headless pins (19) from rollers (20) and frame assembly (15), then remove rollers (20).
- (g) Replace cotter pins (18).
- (h) Clean headless pins (19); replace if damaged or bent.
- (i) Clean rollers (20) and remove any light scoring or burrs; replace if damaged or deeply scored.
- (j) Unscrew and remove locknuts (21) and washers (22) from screws (23).
- (k) Remove screws (23) from blocks (24) and frame assembly (15), then remove blocks (24).
- (l) Replace locknuts (21).
- (m) Replace screws (23) if screwdriver slot or threads are damaged.
- (n) Secure blocks (24) to frame assembly (15) with screws (23) washers (22) and locknuts (21).
- (o) Secure rollers (20) to frame assembly (15) with headless pins (19).
- (p) Insert cotter pins (18) through ends of headless pins (19) and bend prongs in opposite directions around pins.
- (q) Connect frame assembly (15) to beam assembly (6) with headless pin (11).
- (r) Insert cotter pins (10) through headless pin (11) then bend prongs in opposite directions around pin.
- (s) Connect post (9) to frame assembly with headless pin (17).
- (t) Insert cotter pins (16) through headless pin (17), then bend prongs in opposite directions around pin.
- (u) Connect post (9) to beam assembly (6) with bracing pin (8), then insert clip (7) through bracing pin.

(5) Replace roller (20) as detailed in step (4), (f) through (i), (o) and (p).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8
5

3-5. PUSH BARS SHORT, LONG, END FITTINGS

This task covers:

a. Cleaning **b. Inspection** **c. Repair**

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
Standard C-clamps, 8 inch (8, Appendix B, Section III)
Shop Equipment, Supplemental No.1 (3, Appendix B, Section III)
Shop Equipment, Common No.1 (2, Appendix B, Section III)

Materials Required

Pre-Treatment Primer, (14, Appendix C)
Primer Paint, (15, Appendix C)
Finish Paint, (16,17, Appendix C)

Equipment Conditions

Push bar removed from truck or pallet and placed on raised, flat surface.

a. Cleaning

(1) Thoroughly clean push bar, making sure that all foreign matter is removed.
(2) Remove any flaking paint.

b. Inspection

(1) Carry out a thorough visual inspection to determine the extent of damage.
(2) Check for cracked or distorted blocks, plates and cracked welds.

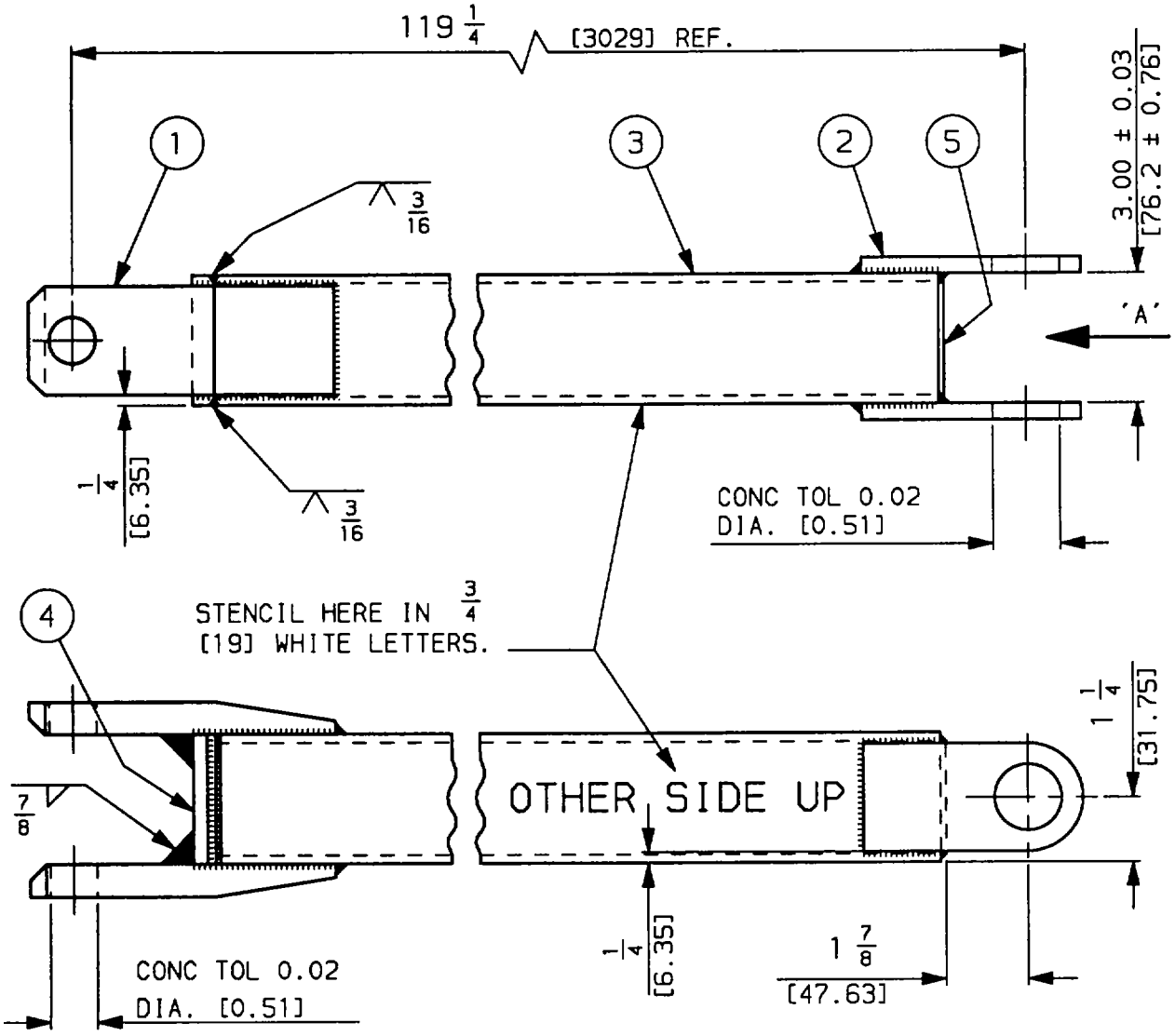
c. Repair

WARNING

Wear protective eye goggles when chipping or grinding. Failure to do so can result in eye injuries and loss of sight.

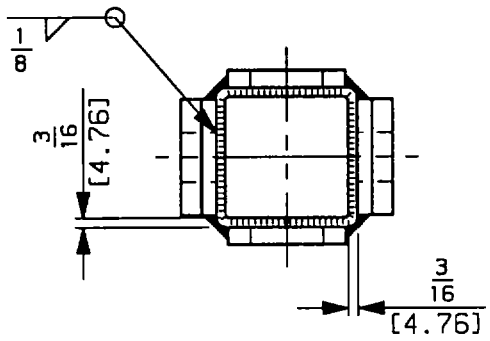
(1) Push bar, short.

(a) Remove push bar link (para. 2-24).
(b) Remove damaged blocks (1) and/or plates (2), (4) or (5) by grinding or chipping off welds, taking care not to damage parent metal.



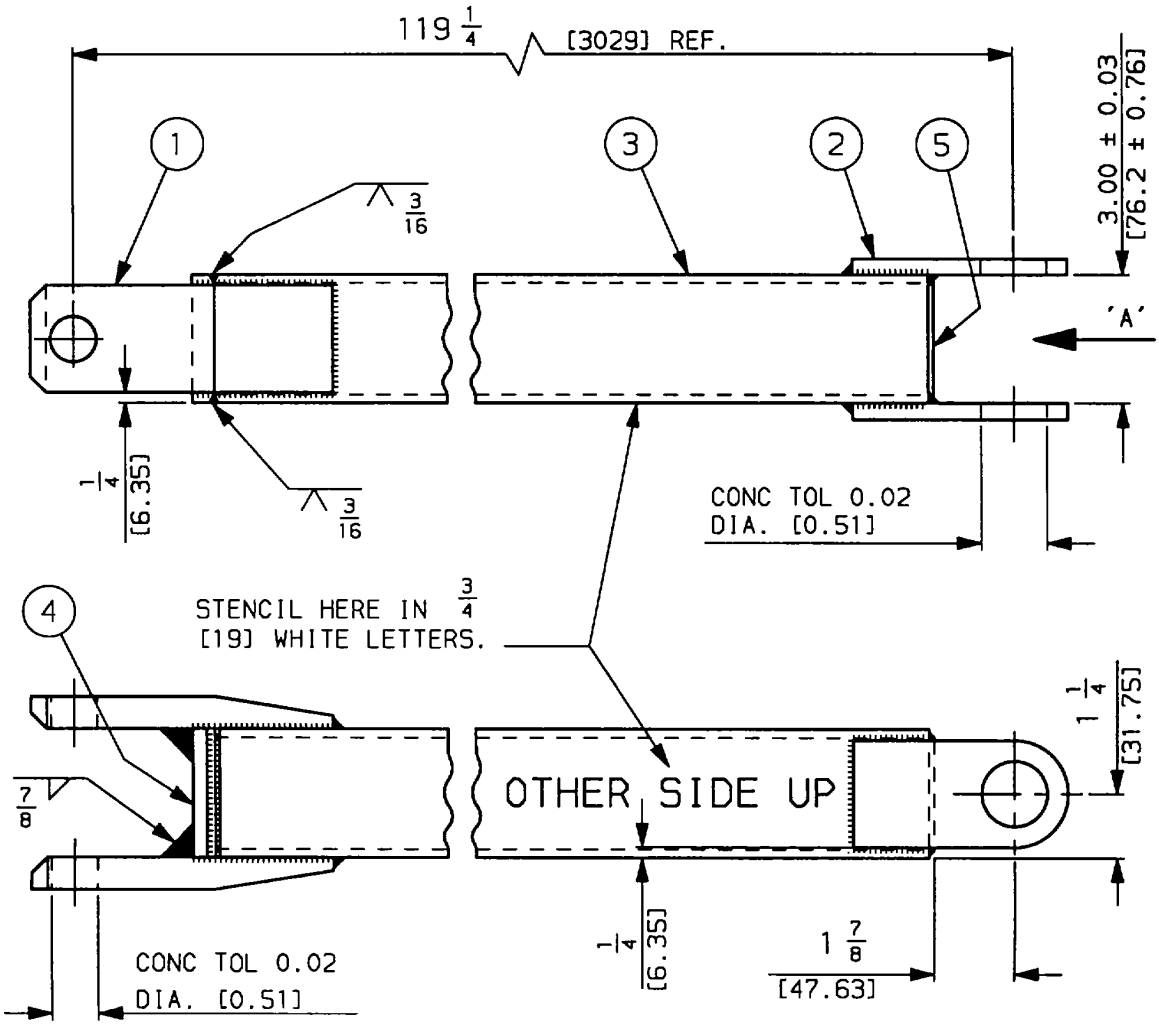
NOTE:-
ALL FILLET WELDS 1/4 [6.35] UNLESS OTHERWISE STATED.

ALL DIMENSIONS IN INCHES [mm]



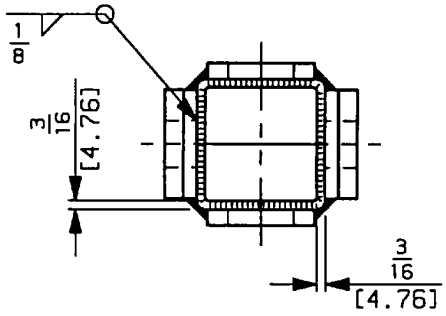
VIEW ON ARROW 'A'

PUSH BAR, SHORT



NOTE:-
ALL FILLET WELDS
1/4 [6.35] UNLESS
OTHERWISE STATED.

ALL DIMENSIONS IN INCHES [mm]



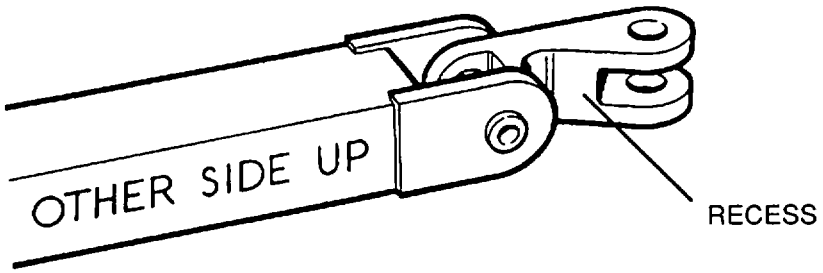
VIEW ON ARROW 'A'

PUSH BAR, SHORT

(c) Remove paint from areas to be welded.
(d) Hold plate (4) in position and tack weld in four positions.
(e) Repeat step (d) above for plate (5) if required.
(f) Mark up bar (3), blocks (1) and/or plates (2).
(g) Tack weld blocks (1) and/or plates (2), then check positioning.
(h) Carry out fillet welding around outside of blocks (1), plates (2) for weld procedures see Appendix E.
(i) Closely inspect the welds. Any cracks shall be chipped out and rewelded.
(j) Position a 3 in bolt and nut between plates (2) and using it as a spreader bar, adjust nut to "open" plates to approximately 3 1/16 in (78mm), to allow 1/16 in (1.58 mm) pull in.
(k) Repeat step (j) above for blocks (1).
(l) Carry out welding on the inside of blocks (1) and plates (2) as shown, Remove bolt when heat has dissipated.
(m) Check that all welds are the correct size.
(n) Mask holes, which must be free of any coating.
(o) Clean surfaces in preparation for protective finish.
(p) Apply pre-treatment, primer and finish paint, except holes which must be free of any coating, in accordance with TM 43-0139, Painting Instructions for Army Materiel.
(q) Fit link and stencil "other side up" (para. 2-24).

CAUTION

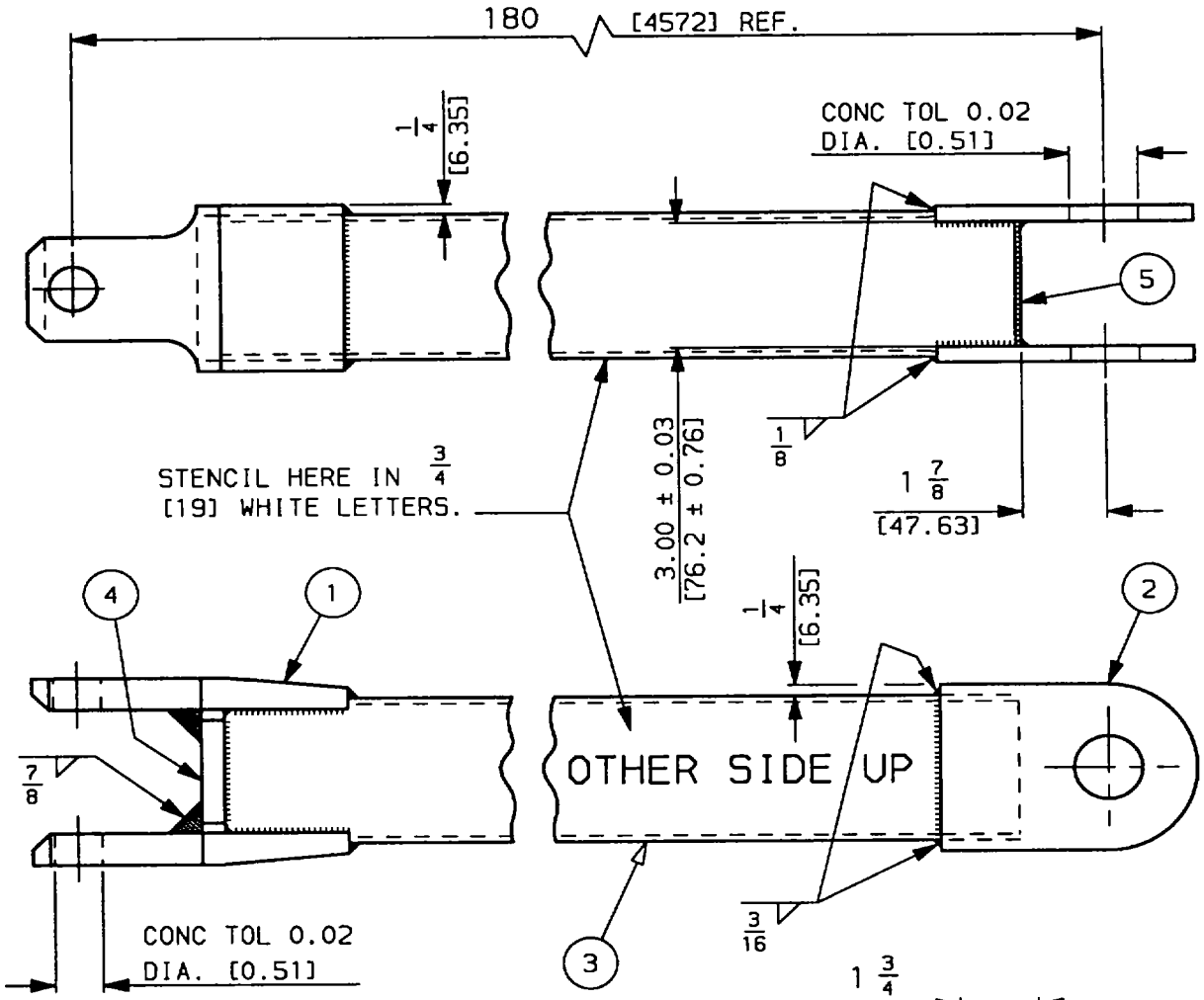
When installing link ensure the recessed portion is on the same side as the "other side up" stencil markings.



(2) Push bar, long.

NOTE

In step (b) ensure that grinding or chipping does not go beyond dimensions shown in sectional views.



DETAIL OF END OF ITEM (3) WITH ITEMS (2) & (5) REMOVED.

DETAIL OF END OF ITEM (3) WITH ITEMS (1) & (4) REMOVED.

NOTE:-
ALL FILLET WELDS 1/4 [6.35] UNLESS OTHERWISE STATED.

ALL DIMENSIONS IN INCHES [mm]

PUSH BAR, LONG

(a) Repeat step (1) (a) to (e) as above.
(b) Clamp blocks (1) and/or plates (2) in position and tack weld.
(c) Check positioning of components and if satisfactory carry out fillet welding by reference to weld procedures Appendix E.
(d) Repeat step (1) (i) to (q) as above.

3-6. ROLLER BEAM, PLAIN ROLLER ASSEMBLY

This task covers:

a. Disassembly b. Inspection c. Repair d. Assembly

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
2 caliper face wrenches (9, Appendix B, Section III)
Protective gloves

Materials Required

Grease, (1, Appendix C)
Cleaning solvent (3, Appendix C)
Clean cloths
Crocus cloth (10, Appendix C)
Boiling water in container large enough to submerge roller

Equipment Conditions

Roller assembly removed from roller beam (para. 2-25) and placed on raised, flat surface

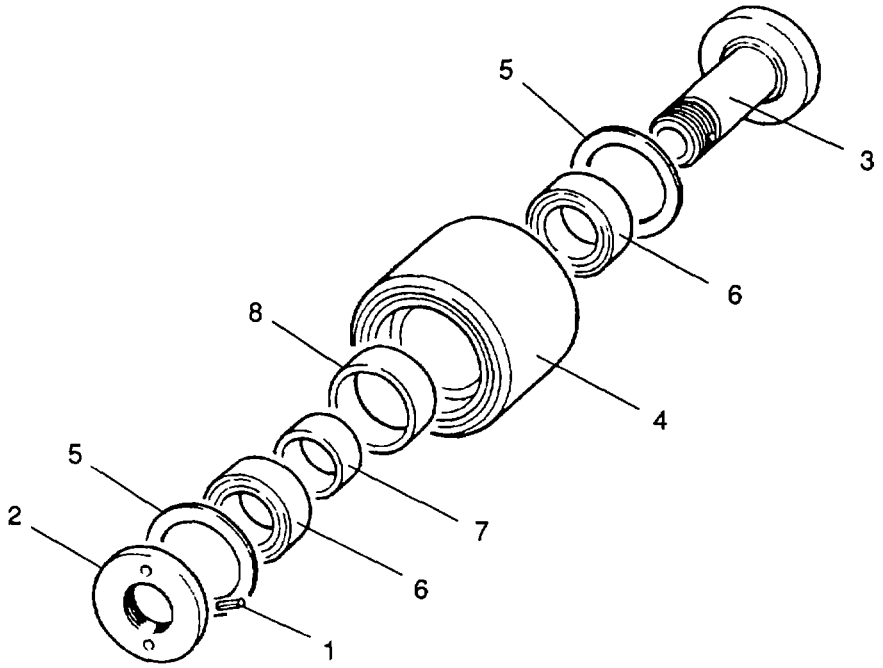
WARNING

Components suspended in boiling water can cause severe burns. Always use protective gloves

NOTE

If Mk 1 roller is fitted, discard and replace with Mk 2 Roller Assembly which is identified by a circular groove on the end plate. If Mk 2 roller is already fitted, proceed as follows. If more than one roller assembly is being repaired at the same time, keep each assembly's components in separate sets.

a. Disassembly



(1) Drive out spring pin (1).
(2) Unscrew and remove flanged nut (2) from flanged sleeve (3), with caliper face wrenches.
(3) Remove flanged sleeve (3) from roller (4) collecting plain washers (5) inner race of bearing (6) and spacers (7).

NOTE

For rollers built to the earlier design outer spacer (8) is not fitted. If this is the case ensure the spacer (8) is available for re-assembly

(4) Remove outer race of bearings (6), and spacer (8), by immersing roller in boiling waterfor5 minutes.
(5) Tap roller firmly on bench, outer race (6) will then slide out.

WARNING

Cleaning solvent is toxic and flammable. Use only in a well ventilated area and avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts and avoid skin contact.

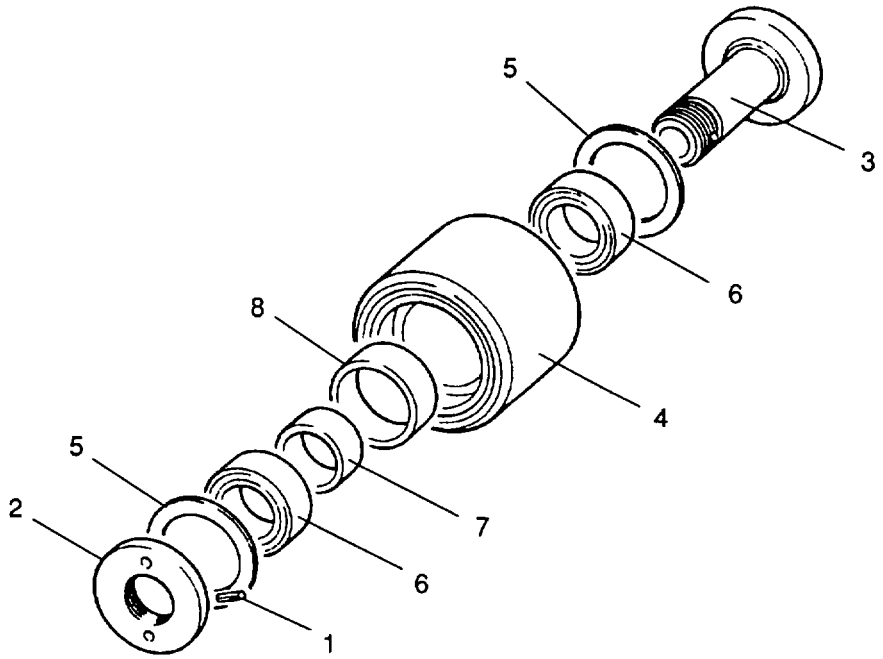
b. Inspection

(1) Clean parts with solvent and dry with clean cloth.
(2) Inspect parts for wear and damage.

c. Repair

(1) Remove any light burrs from roller (4) with crocus cloth, provided that roller is serviceable.
(2) Replace parts as necessary.

d. Assembly



(1) Check that all parts are clean. Pack outer race of bearings (6) with clean fresh grease.
(2) Immerse roller (4) in boiling water for 5 minutes then remove.

NOTE

Ensure bearings (6) are fitted with seal on outside and spacer (8) is available for fitting.

(3) Insert outer race of bearing (6) and spacer (8) in bore of roller (4).
(4) Place inner race of bearing (6), spacer (7) and second inner race of bearing (6) on flanged sleeve (3).
(5) Place washer (5) into recessed bore of roller then carefully insert flanged sleeve (3) through this end of the roller.
(6) Place another plain washer (5) over screwed end of flanged sleeve (3), then fit the flanged nut (2).
(7) Tighten the flanged nut with caliper face wrenches until the spring pin (1) can be lined up and driven through the hole in the sleeve (3), but ensure it does not protrude through into inner bore.
(8) Spin the roller to ensure it rotates freely.

3-7. ROLLER BEAM, FLANGED ROLLER ASSEMBLY

This task covers:

a. Disassembly b. Inspection c. Repair d. Assembly

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
Caliper face wrench (9, Appendix B, Section III)
Slide hammer (10, Appendix B, Section III)
Protective gloves

Materials Required

Grease (1, Appendix C)
Cleaning solvent (3, Appendix C)
Clean cloths
Crocus cloth (10, Appendix C)
Boiling water in container large enough to submerge roller

Equipment Conditions

Roller assembly removed from roller beam (para. 2-25) and placed on raised, flat surface.

WARNING

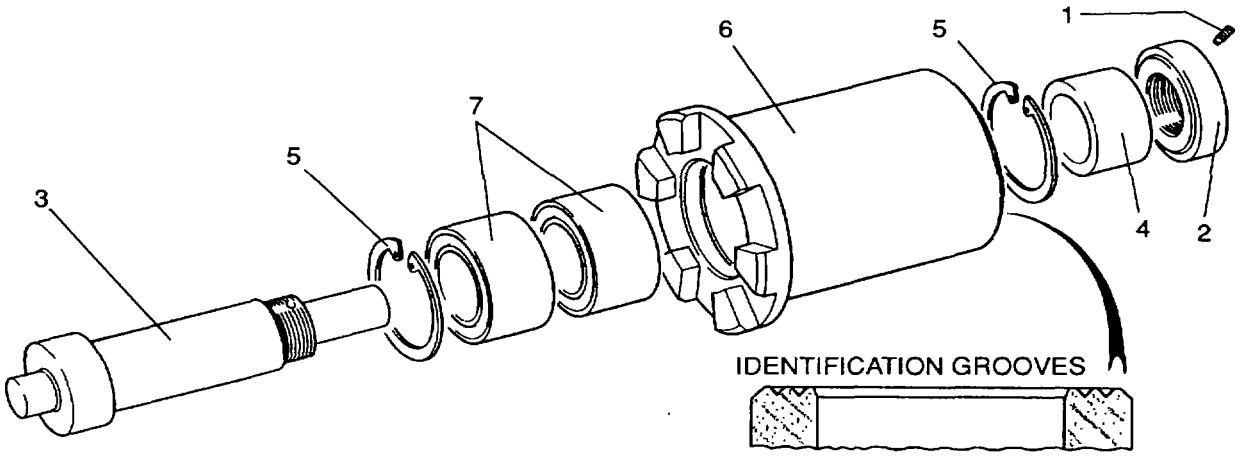
Components suspended In boiling water can cause severe burns. Always wear protective gloves.

NOTE

If Mk 1 roller is fitted, discard and replace with Mk 2 Roller Assembly which is identified by two concentric grooves on the end plate. If Mk 2 roller is already fitted, proceed as follows.

a. Disassembly

(1) Remove socket set screw (1) in flanged nut (2).
(2) Using caliper face wrench unscrew and remove flanged nut (2) from shaft (3).
(3) Remove shaft (3) and spacer sleeve (4) from roller.



(4) Take out circlips (5).
(5) Submerge roller (6) in boiling water for 5 minutes to allow expansion, then remove.
(6) Tap roller (6) firmly down endways on bench then roller bearings (7) should slide out.

WARNING

Cleaning solvent is toxic and flammable. Use only In a well ventilated area and avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use lin excessive amounts and avoid skin contact.

b. Inspection

(1) Clean parts with solvent (except for sealed bearings) and dry with a clean cloth.
(2) Inspect parts for wear and damage.

c. Repair

(1) Remove any light burrs from roller (6) with crocus cloth, provided that roller is serviceable.
(2) Replace parts as necessary.

d. Installation

(1) Check that all parts are clean.
(2) Submerge roller (6) in boiling water for 5 minutes to allow expansion, then remove.
(3) Slide bearings (7) into roller and secure in position with circlips (5).
(4) Insert shaft (3) into roller from shouldered end, then fit spacer sleeve (4) over end of shaft.
(5) Screw flanged nut (2) onto shaft using caliper face wrench and tighten until socket set screw holes are lined up.

(6) Insert set screw (1) and spin roller to ensure freedom of movement, then tighten screw and stake set screw.

3-8. LAUNCHING NOSE CROSS GIRDER, ROLLER ASSEMBLY

This task covers:

a. Disassembly **b. Inspection** **c. Repair** **d. Assembly**

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
1 1/4 and 1 1/2 AF open ended wrenches (11, 12, Appendix B, Section III)
Protective gloves

Materials Required

Grease, (1, Appendix C)
Cleaning solvent (3, Appendix C)
Clean cloths
Crocus cloth (10, Appendix C)
Boiling water in container large enough to submerge roller

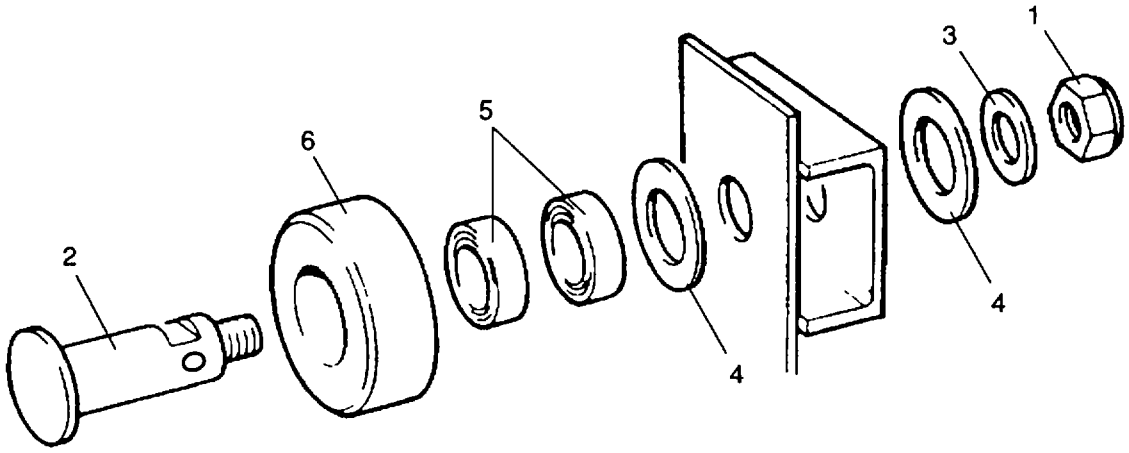
Equipment Conditions

Launching nose cross girder on raised flat surface.

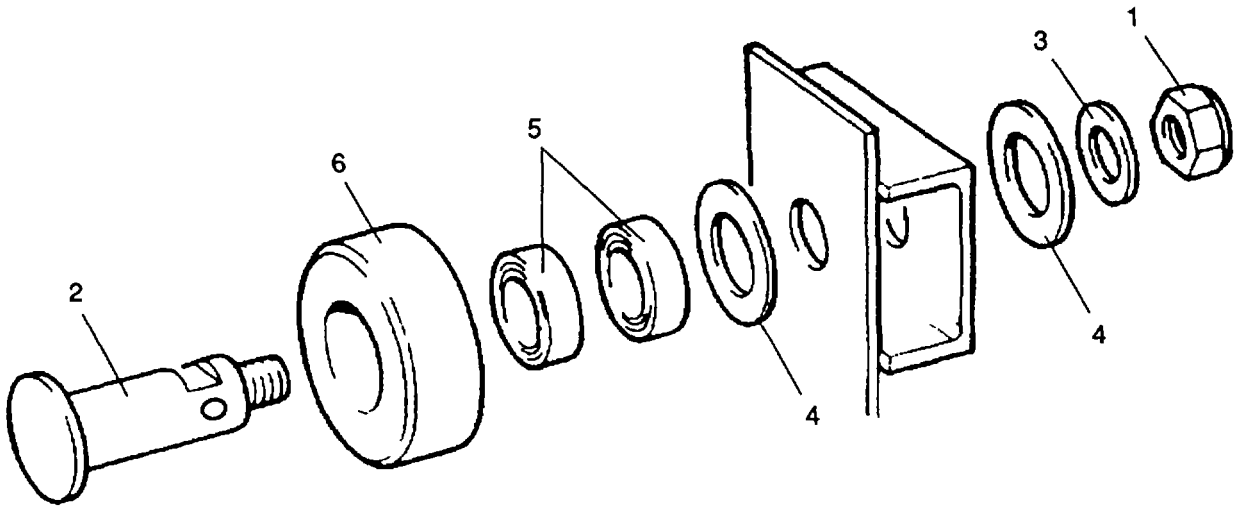
WARNING

Components suspended in boiling water can cause severe burns. Always use protective gloves.

a. Disassembly



(1) Unscrew and remove locknut (1) from shaft (2), by gripping shaft on flat with 1 1/4 wrench, or using pry bar through hole in shaft (if fitted).
(2) Remove washer (3), two washers (4), and roller (6) from shaft (2).



(3) Immerse roller in boiling water for 5 minutes to allow expansion, then remove.
(4) Tap roller firmly on the bench. Bearings (5) will then slide out.

b. Inspection

WARNING

Cleaning solvent is toxic and flammable. Use only in a well ventilated area and avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts and avoid skin contact.

(1) Clean all components, except bearings, with cleaning solvent and dry with a clean cloth.
(2) Inspect components for wear and damage.

c. Repair

(1) Remove any light burrs from roller (6) with crocus cloth, provided that roller is serviceable.
(2) Replace parts that are worn or damaged.
(3) Replace locknut.
(4) Pack bearings (5) with clean, fresh grease.

d. Assembly

(1) Immerse roller (6) in boiling water for 5 minutes to allow expansion, then remove.
(2) Fit bearings (5) into roller (6).
(3) Insert shaft (2) through roller, then fit large washer (4). Position assembly on launching nose cross girder, fit washer (4), washer (3) and secure with new locknut.
(4) Spin roller (6) to ensure it rotates freely.

3-9. HYDRAULIC JACK 15T

This task covers:

a. Disassembly b. Cleaning c. Inspection d. Assembly e. Testing

INITIAL SETUP:

Tools Required

Torque wrench (17, Appendix B, Section III)
Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
Air compressor (4, Appendix B, Section III)
Shop Equipment, Supplemental No.1 (3, Appendix B, Section III)
Shop Equipment, Common No. 1 (2, Appendix B, Section III)

Materials Required

Paper (80 gm/m^2) (22, Appendix C)
Lubricating oil, (2, Appendix C)
Cleaning solvent (3, Appendix C)
Clean cloths
Container, 3 pint (2 liter) capacity
18 ton test load
Replacement seals (TM 5-5420-212-23P)

Equipment Conditions

Jack removed from pallet and placed on raised, flat surface.

a. Disassembly

WARNING

The relevant warning must be observed when using compressed air or cleaning solvent.

When using compressed air, wear safety goggles or glasses and ensure that air blast is not directed toward another person.

Cleaning solvent is toxic and flammable. Use only in a well-ventilated area. Avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts. Avoid skin contact.

CAUTION

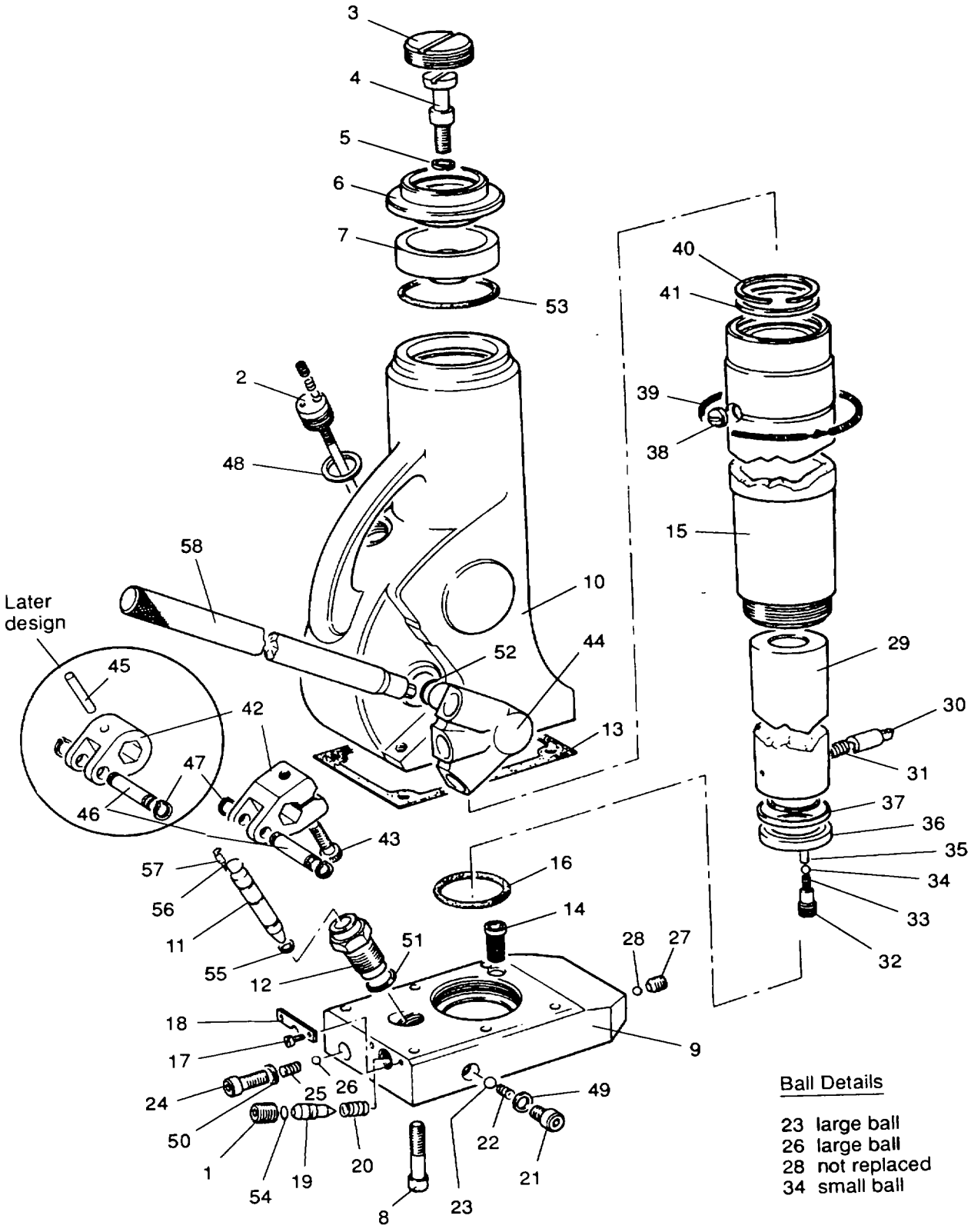
Special care must be taken when disassembling components to ensure freedom from grit, etc. Valve seats and mating surfaces must be kept free from scratches and other damage.

NOTE
Replace all seals when jack is stripped and overhauled.

(1) Remove all grease, oil and dirt from jack surfaces.
(2) Loosen release valve screw (1) 1 1/2 turns and press down ram as far as it will go.
(3) Remove filler cap/dipstick (2).
(4) Drain oil into suitable container, approximately 2 5/8 pints (1 1/2 liters).
(5) Remove keeper plate (3), cap pin (4), lock washer (5), swivel cradle (6) and swivel cradle seat (7).
(6) Remove six base screws (8).
(7) Using a plastic mallet, tap the toe of the base (9) until free from seal, then drain off remaining oil into container.
(8) Continue tapping base with plastic mallet until it separates from body (10).
(9) Remove pump plunger (11) from pump barrel (12).
(10) Remove gasket (13) and filter (14).
(11) Unscrew ram liner (15) from base by holding liner, possibly in a soft-jawed vice, and tapping base with plastic mallet.

NOTE
Examine condition of oil remaining in base to give an indication of wear.

(12) Remove pump barrel (12) by holding base in soft-jawed vice, and using box wrench or socket on barrel.
(13) Remove sealing ring (16) from base.
(14) Unscrew and remove screws (17) from release valve instruction plate (18), then remove plate.
(15) Remove release valve screw (1), release valve (19) and spring (20).
(16) Remove delivery valve screw (21), spring (22) and ball bearing (23).
(17) Remove suction valve screw (24), spring (25) and ball bearing (26).
(18) Remove grub screw (27) and ball bearing (28).
(19) Push ram (29) out of bottom of liner (15) do not use excessive force and keep hand over bottom of ram so that trigger guide (30) and compression spring (31) do not jump out.
(20) Unscrew trip valve cage (32), remove spring (33), ball bearing (34) and lifter pin (35).
(21) Remove ram packing (36) comprising seal and anti-extrusion (A.E) ring (37).
(22) Remove valve head (38) and retaining spring (39).
(23) Remove the retaining ring (40) and wiper ring (41) from inside the ram liner.


Later design
Ball Details
23 large ball
26 large ball
28 not replaced
34 small ball

NOTE

To ensure correct alignment of tumbler on quadrant shaft, scribe a line across tumbler (42) and on inside of body (10) before disassembly of these two items.

(24) Turn body upside down and scribe position of tumbler (42) on side of body, then use an Allen key to remove the socket screw (43), on early design, securing tumbler to quadrant (44).

NOTE

Alternative fitting of tumbler (later design) will be a spring pin (45), as shown on inset.

(25) Slide quadrant out of body and remove tumbler complete with grooved pin (46) and circlips (47).

b. Cleaning

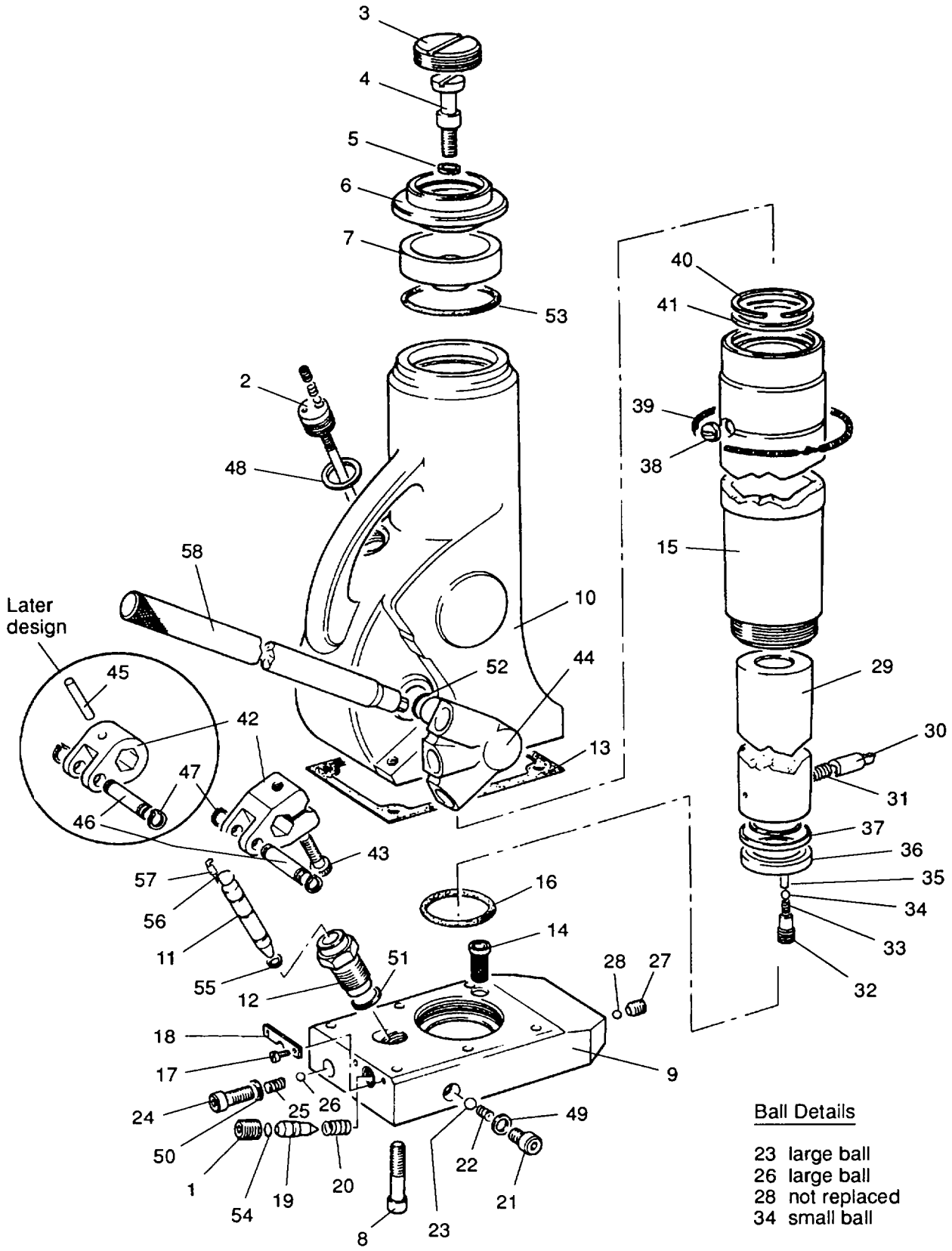
WARNING

Cleaning solvent is toxic and flammable. Use only in a well ventilated area and avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts and avoid skin contact.

CAUTION

Do not allow cleaning solvent to come into contact with new seals or packing.

(1) Remove and clean off all trace of base seal from base and body.
(2) Clean all components in a bath of solvent with a brush, then dry thoroughly with compressed air.
(3) Blow through oilways in base and trip valve cage (32) with compressed air.
(4) Clean filter (14) and blow through with compressed air.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Ball Details
23 large ball
26 large ball
28 not replaced
34 small ball

c. Inspection

(1) Inspect dipstick/filler (2), keeper plate (3), cap pin (4), swivel cradle (6) and swivel cradle seat (7) for damage and burrs. Check for bent cap pin (4).
(2) Inspect release valve screw (1), spring (20) and release valve (19) for damage.
(3) Inspect delivery valve screw (21), spring (22) and ball bearing (23) and also the aluminum flat washer (49) for damage.
(4) Inspect suction valve screw (24), spring (25) and ball bearing (26) and also the aluminum flat washer (50) for damage.
(5) Examine the threads on the six base screws (8) for wear and check that screws are not bent.
(6) Inspect seating between base (9) and body (10) for damage, and liner (15) bore for wear and damage.
(7) Inspect all threads and oilways for dirt, damage and wear.
(8) Inspect quadrant (44) jack handle holes for wear and cracking, and quadrant location hole through body (10) for wear.
(9) Inspect body (10) generally for damage, particularly around top.
(10) Inspect tumbler (42), roller (46) and circlips (47).
(11) Examine pump barrel bore (12) and pump plunger 11) for scoring and also aluminum fiat washer (51) for damage.
(12) Inspect liner (15) and ram (29) for scoring, wear and damage.
(13) Inspect all valve seats for wear and damage.
(14) Inspect lifter pin (35), ball bearing (34), spring (33) and cage (32), trigger guide (30) and compression spring (31) for wear and damage.
(15) Examine hole in base of ram to ensure that lifter pin (35) can move freely up and down.

d. Assembly

NOTE

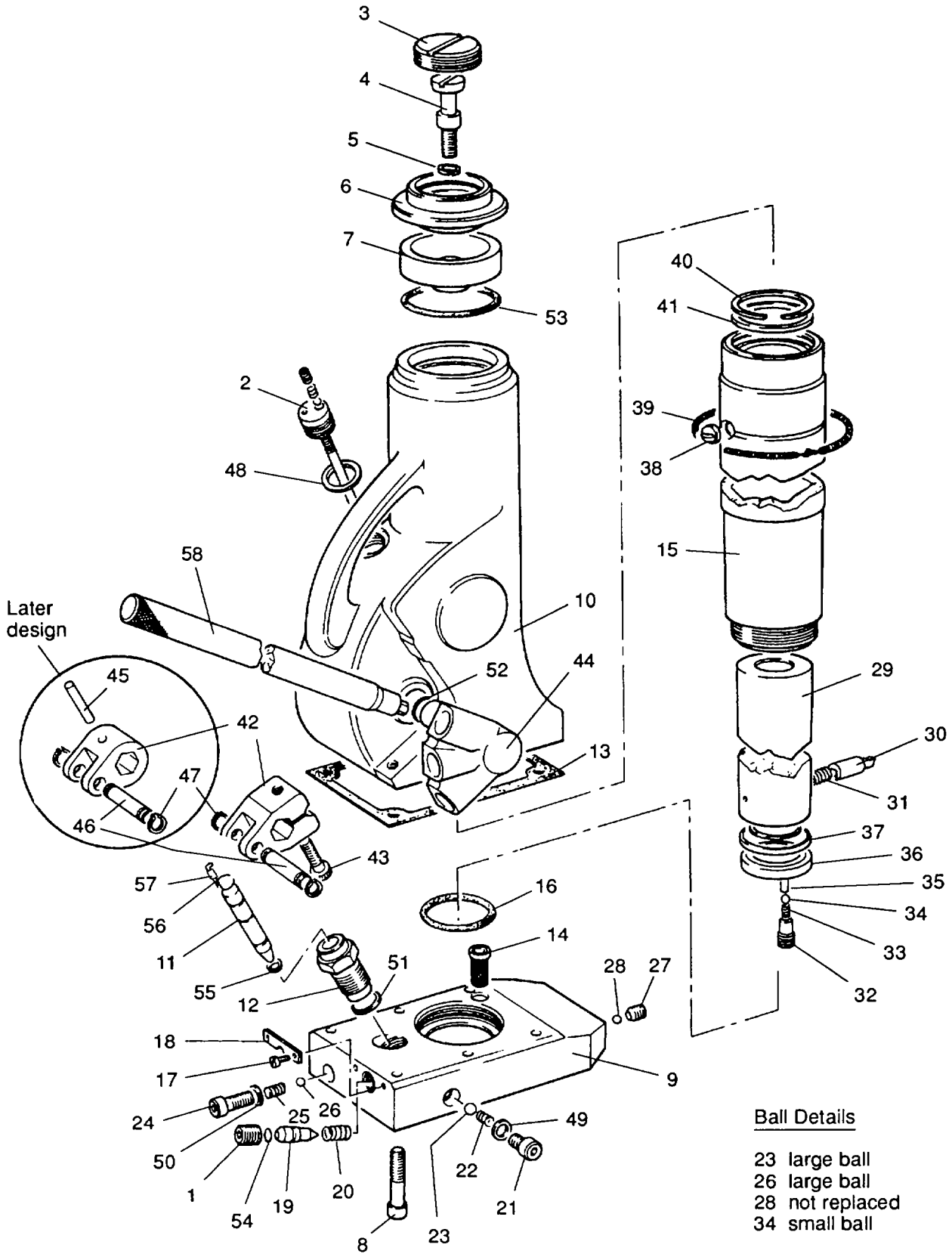
Replace all seals (except flat washers, which need only to be replaced if damaged) and smear all seals and mating surfaces with oil before assembly. Fit all conical springs with the small end towards ball.

(1) Remove the old quadrant seal (52) and replace with new.
(2) Turn body (10) upside down, then insert quadrant (44) and place tumbler assembly (42) on shaft.

NOTE

Ensure tumbler lines up with marks on body previously scribed. Ensure that quadrant is pressed fully in and centralize tumbler before tightening pinch bolt, or before driving spring pin so that it seats in groove on quadrant shaft.

(3) Replace and tighten socket screw (43) to secure tumbler on shaft, or drive in spring pin (45) - see inset.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Ball Details
23 large ball
26 large ball
28 not replaced
34 small ball

(4) Turn body right way up and insert sealing ring (53) into groove inside top of body.
(5) Replace valve head (38) and retaining spring (39) on ram liner (15). Ensure spring portion of retaining spring is over valve head-not wire.

NOTE

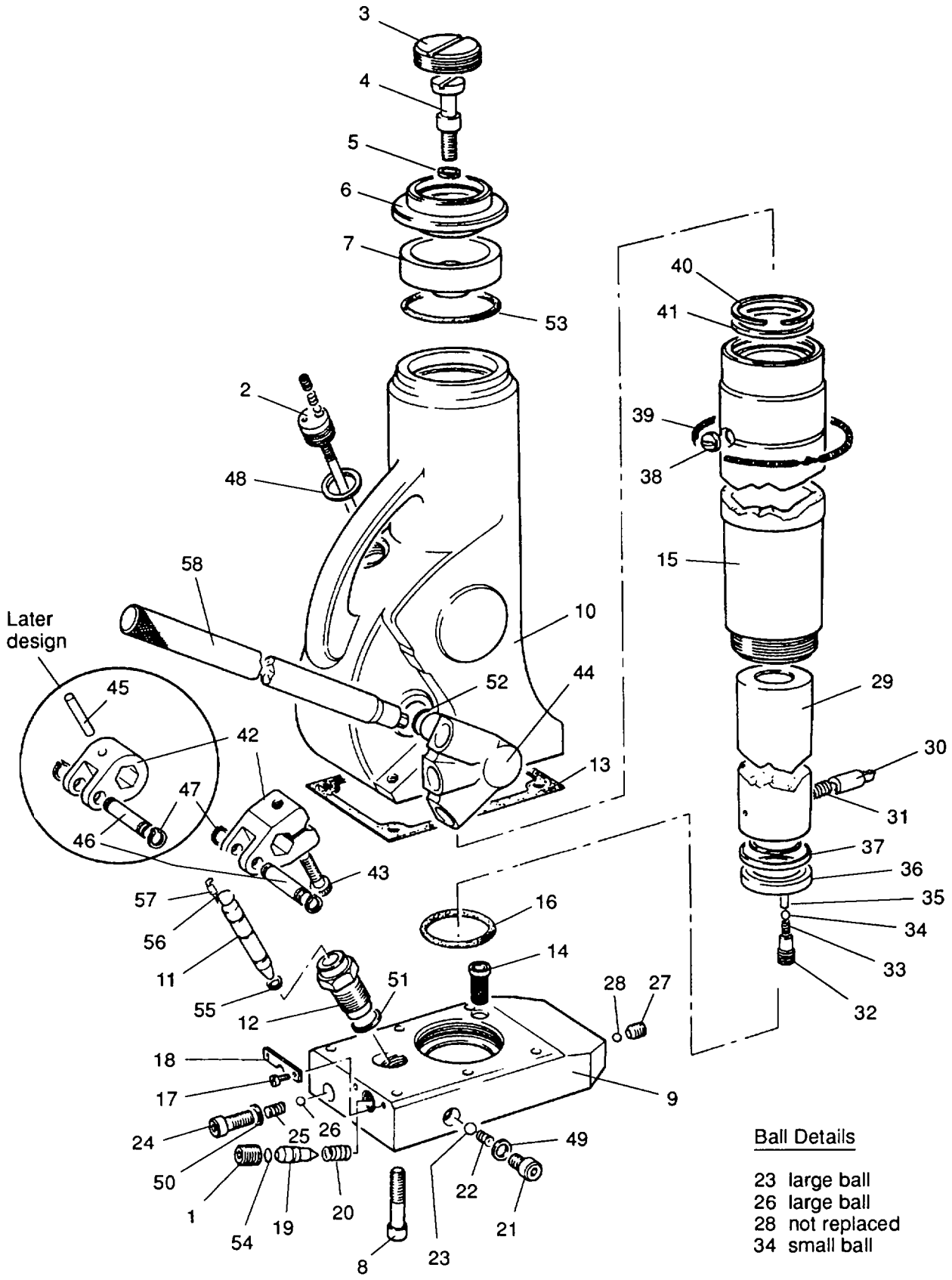
Ensure that seal is fitted with wiper edge (sharp edge) uppermost.

(6) Replace wiper ring (41) and retaining ring (40).
(7) Stand ram (29) upside down so that preformed packing (36) and A.E ring (37) can be fitted.
(8) Place A.E ring (37) in position on ram with flat side downward to ram.
(9) Work preformed packing (36) onto ram until it locates correctly under flange.
(10) Insert spring (31) and trigger guide (30), ensuring that it is operating correctly. Ensure that slot in trigger guide is pointing towards ram packing (36).
(11) Assemble lifter pin (35), ball bearing (34), spring (33) and trip valve cage (32) in hole, and screw trip valve cage into ram until firmly seated. With the ram packing uppermost hold trigger guide assembly (30) in position, with slot upwards so that lifter pin (35) locates in slot. Test for correct assembly. Trigger guide (30) should spring backwards and forwards smoothly and trigger must spring downwards when pushed vertically.
(12) Smear oil on ram and inside of liner.

CAUTION

Ensure that A.E ring does not damage edge of liner bore.

(13) Hold ram in one hand and retaining trigger guide (30) in hole, use other hand to insert upper part of ram into liner until trigger guide is just located inside liner bore, then carefully feed A.E ring (37) into bore with preformed packing (36).
(14) Replace grub screw (27) and ball bearing (28) in base. Tighten to 50 ft lb.
(15) If suction valve washer (50) was found damaged on inspection, replace with new item, then assemble ball bearing (26), spring (25) and screw (24) and tighten to 50 ft lb.
(16) If delivery valve washer (49) was found damaged on inspection replace with new item, then assemble ball bearing (23), spring (22) and screw (21) and tighten to 50 ft lb.
(17) Replace sealing ring (54) on release valve (19), then assemble spring (20), release valve (19) and release valve screw (1) and tighten hand tight only.
(18) Fit release valve instruction plate (18) and secure with screws (17).
(19) If pump barrel washer (51) was found damaged on inspection, replace with new item, then screw pump barrel (12) into base and tighten to 90 ft lb.
(20) Remove pump plunger seal (55) from pump plunger (11) and replace with new.
(21) If retaining clip (56) requires replacing, lock with clip ferrule or locking wire (57).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Ball Details
23 large ball
26 large ball
28 not replaced
34 small ball

(22) Fit new sealing ring (16) into base then screw liner (15) into base. Tighten to 75 ft lb.
(23) Fit pump plunger into pump barrel (12) until center groove is flush with top of barrel.
(24) Refit filter (14) and new base gasket (13). Do not use gasket sealant.
(25) Ensure that center groove in plunger (11) is flush with top of barrel (12), then with assembled base and liner flat on bench with toe pointing away from you, lift body (10) with one hand, and holding quadrant (44) in upper position with other hand, carefully lower body over liner, turning it at an angle of approximately 45° so it does not interfere with plunger.
(26) When body has cleared plunger, lower it down square to base, and allow sealing ring (53) to rest on liner (15) with quadrant still held in upper position. This will allow the body to rock backwards and forwards.
(27) Push the body to its foremost position and slowly push quadrant into lower position then pull body backwards approximately '12 in (12mm).

NOTE

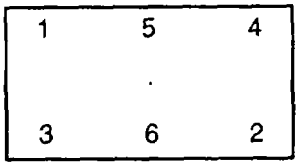
Grooved pin (46) should now be located under retaining clip (56).

(28) Still holding body in backward position strike top of body with soft-faced hammer to enable it to ride over seal and drop onto base gasket (13).

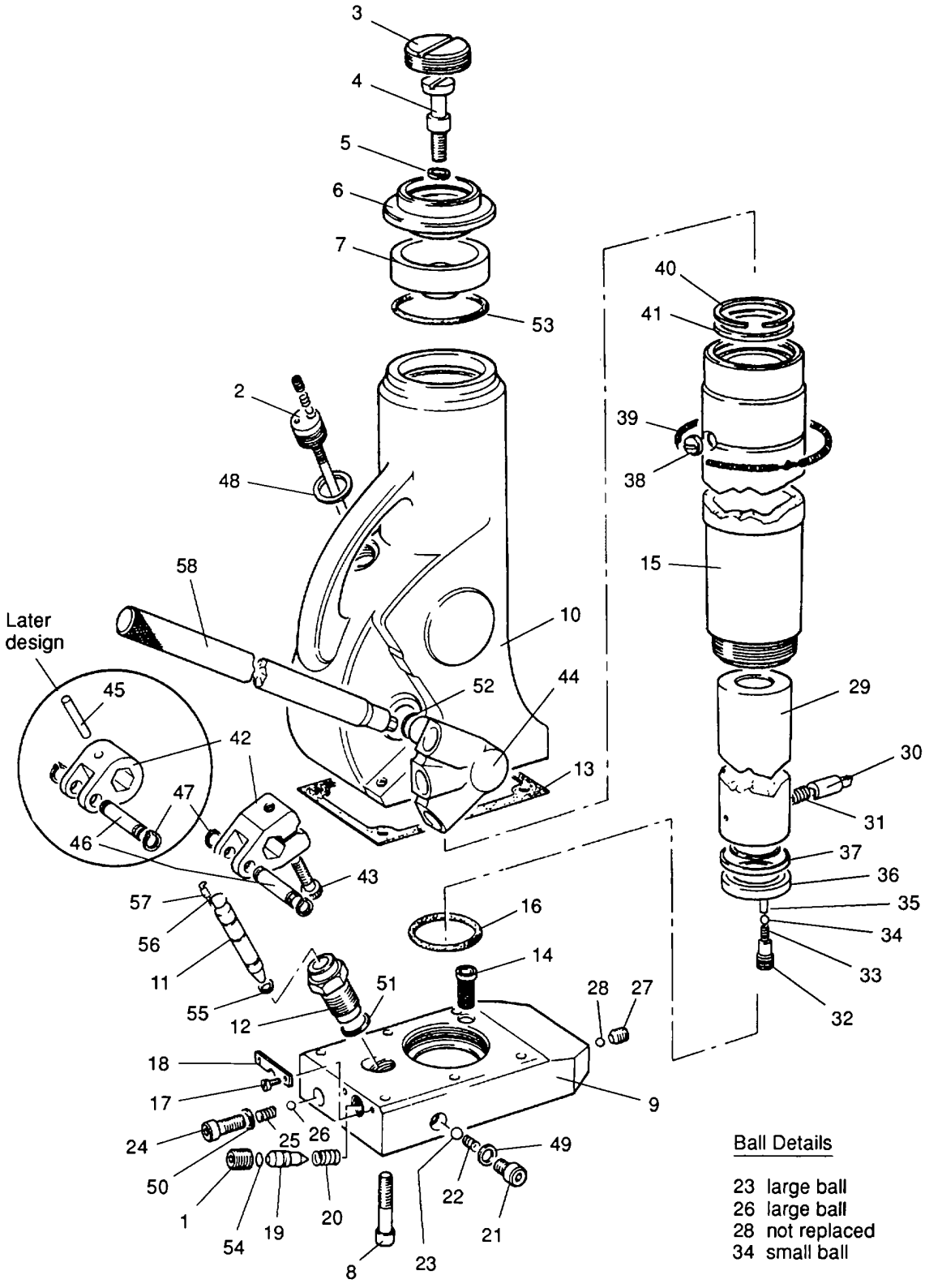
NOTE

To check for correct assembly operate quadrant up and down several times and listen for air, pulsing from pump, at oil filler hole.

(29) Fit the six base screws (8) and tighten sequentially to 65 ft lb.



(30) Assemble swivel cradle seat (7), swivel cradle (6), lock washer (5) and cap pin (4). Tighten cap pin.
(31) Replace keeper plate (3) but do not overtighten.
(32) Fill with fresh, clean oil, approximately 2 5/8 pints (1 1/2 liters), to not more than 1 inch (25mm) above mark on dipstick.
(33) Replace dipstick.
(34) Remove any air from jack as follows:
  (a) Tighten release valve screw (1).
  (b) Insert operating handle (58) into quadrant (45).
  (c) Operate pump until ram has risen approximately 3 in (76 mm).
  (d) Unscrew release valve screw (1) no more than 1 to 1 1/2 turns.
  (e) Press down ram as far as it will go and listen for air.
  (f) Repeat steps (a) to (e) until all air has been expelled.



Ball Details

23 large ball
26 large ball
28 not replaced
34 small ball

e. Testing

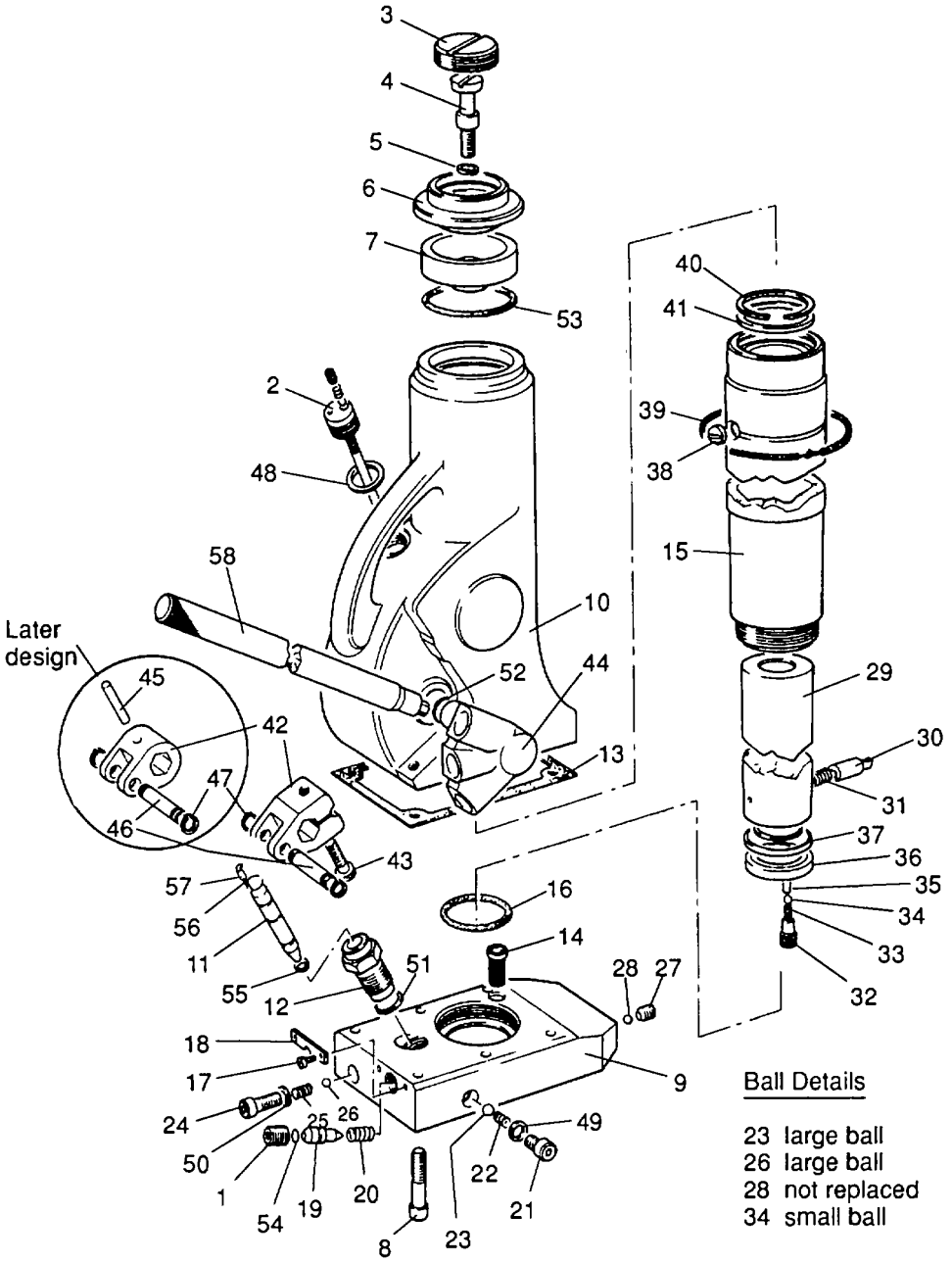
All tests shall be carried out as detailed below.

(1) Acceptance Test
- (a) Close release valve screw (1).
- (b) Insert operating handle into quadrant, and pump jack until ram is fully extended approximately 12 in (300 mm). Trip valve has operated if jack can still be pumped after end of ram stroke. (Oil will only be circulated back into reservoir. Some oil may appear at top of liner).
- (c) Jack must pump freely throughout full stroke of operating handle.
- (d) Open release valve and ensure that ram fully retracts; close release valve.
- (e) Using the operating lever extend the ram approximately 2 in (50 mm),then position the jack under a test rig and continue to use the operating lever until the test rig load indicator reads 15 ton (the rated load for the jack).
- (f) Use the operating lever to apply a further load of 3.75 tons making a total of 18.75 tons (which is the rated load plus 25% excess). Maintain this load for a minimum time of 15 mins.
- (g) Visually check for oil leaks at the following points:
  - 1 Joint between housing (10) and base (9).
  - 2 Quadrant shaft sealing ring (52).
  - 3 Release valve screw (1).
  - 4 Suction valve screw (24).
  - 5 Delivery valve screw (21).
  - 6 Base plug screw (27).
- (h) Open release valve and ensure ram fully retracts; close relief valve.
- (i) Position jack beneath small load, between 2 and 4 tons, and extend ram approximately 6 in (152 mm). Jack must support load for 20 to 30 seconds.
- (j) Visually check for oil leaks as detailed in step (g) above.

(2) Storage Test

After successful completion of Acceptance Test in step (1) above, a two day storage test shall be carried out as detailed below. An ambient temperature of 100^{o}F (37.7^{o}C) shall be maintained throughout the test.
- (a) Check oil level and fill if necessary.
- (b) Tighten filler cap and remove any surplus oil from all external surfaces.
- (c) Ensure that ram is fully retracted.
- (d) Lay jack down on its side with filler cap UPPERMOST.
- (e) Place a sheet of standard duplication (copying) paper (80 gm/m^{2}) under the jack and directly beneath the filler cap, as a leak indicator.

(f) Check paper after 48 hours for an oil stain. If stain is present, measure the diameter.
(g) If mean diameter is 3.9 in (100 mm) or less, jack is acceptable and no further testing is necessary.
(h) If stain is above mean diameter in (g) above, keep jack under observation for a further 48 hours.
(i) If stain does not increase in size by more than 10% during the further 48 hour period, the jack is acceptable.
(j) If oil stain has increased by more than 10% in the further 48 hour period, the jack shall be rebuilt with new seals and gaskets. It must then be re-submitted for testing as detailed in paragraph e. (1) and (2).



3-10. HYDRAULIC JACK 20T

This task covers:

a. Disassembly b. Cleaning c. Inspection d. Assembly
e. Testing

INITIAL SETUP:

Tools Required

Torque wrench (17, Appendix B, Section III)
Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
Air compressor (4, Appendix B, Section III)
Shop Equipment, Supplemental No. 1 (3, Appendix B, Section III)
Shop Equipment, Common No. 1 (2, Appendix B, Section III)

Materials Required

Paper (80gm/m^2) (22, Appendix C)
Lubricating oil, (2, Appendix C)
Cleaning solvent (3, Appendix C)
Clean cloths
Container, 3 1/2 pints (2 liter) capacity
25 ton test load
Replacement seals (TM 5-5420-212-23P)

Equipment Conditions

Jack removed from pallet and placed on raised, flat surface.

a. Disassembly

WARNING

The relevant warning must be observed when using compressed air or cleaning solvent.

When using compressed air, wear safety goggles or glasses and ensure that air blast is not directed toward another person.

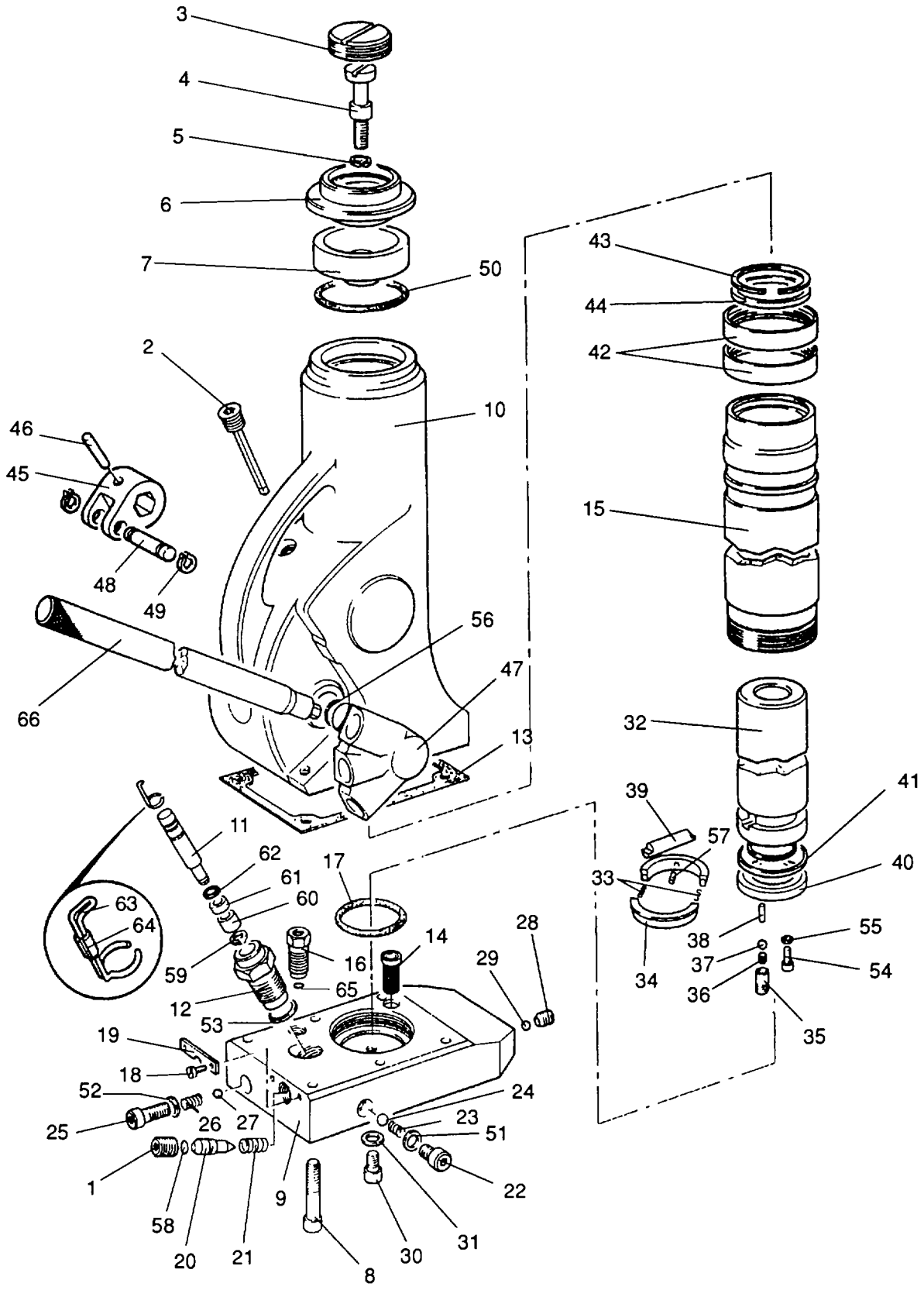
Cleaning solvent is toxic and flammable. Use only in a well-ventilated area. Avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts. Avoid skin contact.

CAUTION

Special care must be taken when disassembling components to ensure freedom from grit, etc. Valve seats and mating surfaces must be kept free from scratches and other damage.

NOTE

Replace all seals when jack is stripped and overhauled.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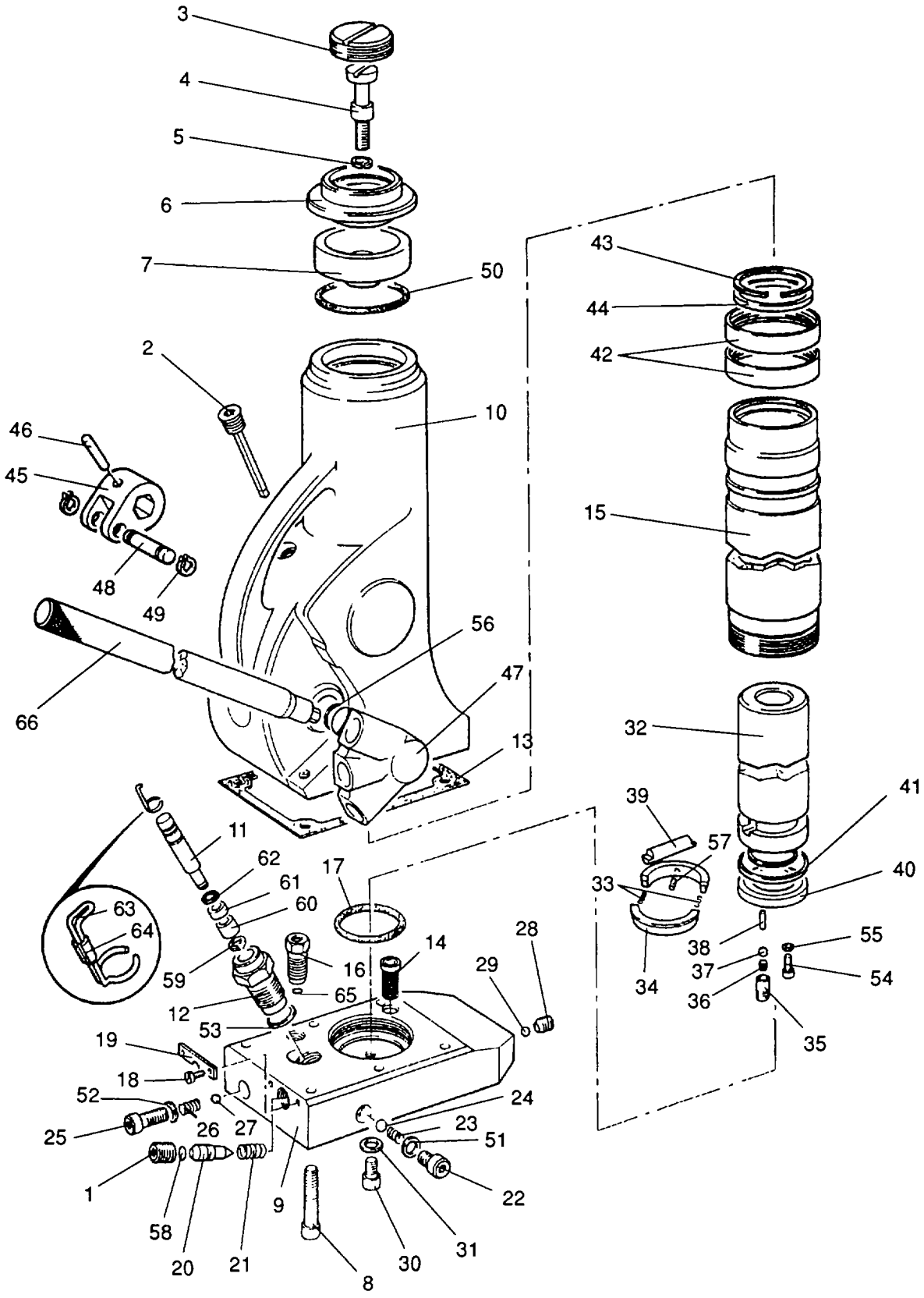
(1) Remove all grease, oil and dirt from jack surfaces.
(2) Loosen release valve screw (1) 1 1/2 turns and press ram down as far as it will go.
(3) Remove dipstick/filler screw (2).
(4) Drain oil into suitable container, approximately 2 5/8 pints (1.5 liters).
(5) Remove keeper plate (3), cap pin (4), lock washer (5), swivel cradle (6) and swivel cradle seat (7).
(6) Remove six base screws (8). Do not remove center base plug.
(7) Using a plastic mallet, tap the toe of the base (9) until free from seal, then drain off remaining oil into container.
(8) Continue tapping base with plastic mallet until it separates from body (10).
(9) Remove pump plunger (11) from pump barrel (12).
(10) Remove base gasket (13) and filter (14).
(11) Unscrew ram liner (15) from base by holding liner, possibly in a soft-jawed vice, and tapping base with plastic mallet.

NOTE
Examine condition of oil remaining in base to give an indication of wear.

(12) Remove pump barrel (12) by holding base in soft-jawed vice, and using box wrench or socket on barrel.

WARNING
Do not disassemble pressure relief valve (16).

(13) Remove pressure relief valve body (16) from base. Do not use key on internal hexagon as this disassembles pressure relief valve. Use box wrench on outer hexagon.
(14) Remove sealing ring (17) from base.
(15) Unscrew and remove screws (18) from release valve instruction plate (19), then remove plate.
(16) Remove release valve screw (1) release valve (20) and spring (21).
(17) Remove delivery valve screw (22), spring (23) and ball bearing (24).
(18) Remove suction valve screw (25), spring (26) and ball bearing (27).
(19) Remove grub screw (28) and ball bearing (29).
(20) Remove base plug (30) and base plug seal (31).
(21) Push ram (32) out of bottom of liner (15); do not use excessive force, and keep hand around ram so that springs (33) do not jump out when control rings (34) clear bottom of liner.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(22) Unscrew trip valve cage (35), remove spring (36), ball bearing (37) and lifter pin (38). Withdraw trip bar (39).
(23) Remove ram packing (40) comprising seal and A.E ring (41).
(24) Remove gaiter seals (42) from the outside of liner, then the ram wiper retaining ring (43) and ram wiper ring (44) from the inside.
(25) Turn body (10) upside down and scribe position of tumbler (45) on side of body, then use a drift pin to drive out the spring pin (46) securing tumbler to quadrant shaft (47).
(26) Slide quadrant shaft (47) out of body (10) and remove tumbler (45) complete with grooved pin (48) and circlips (49).
(27) Remove sealing ring (50) from inside top of body (10).

b. Cleaning

WARNING

Cleaning solvent is toxic and flammable. Use only in a well ventilated area and avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use in excessive amounts and avoid skin contact.

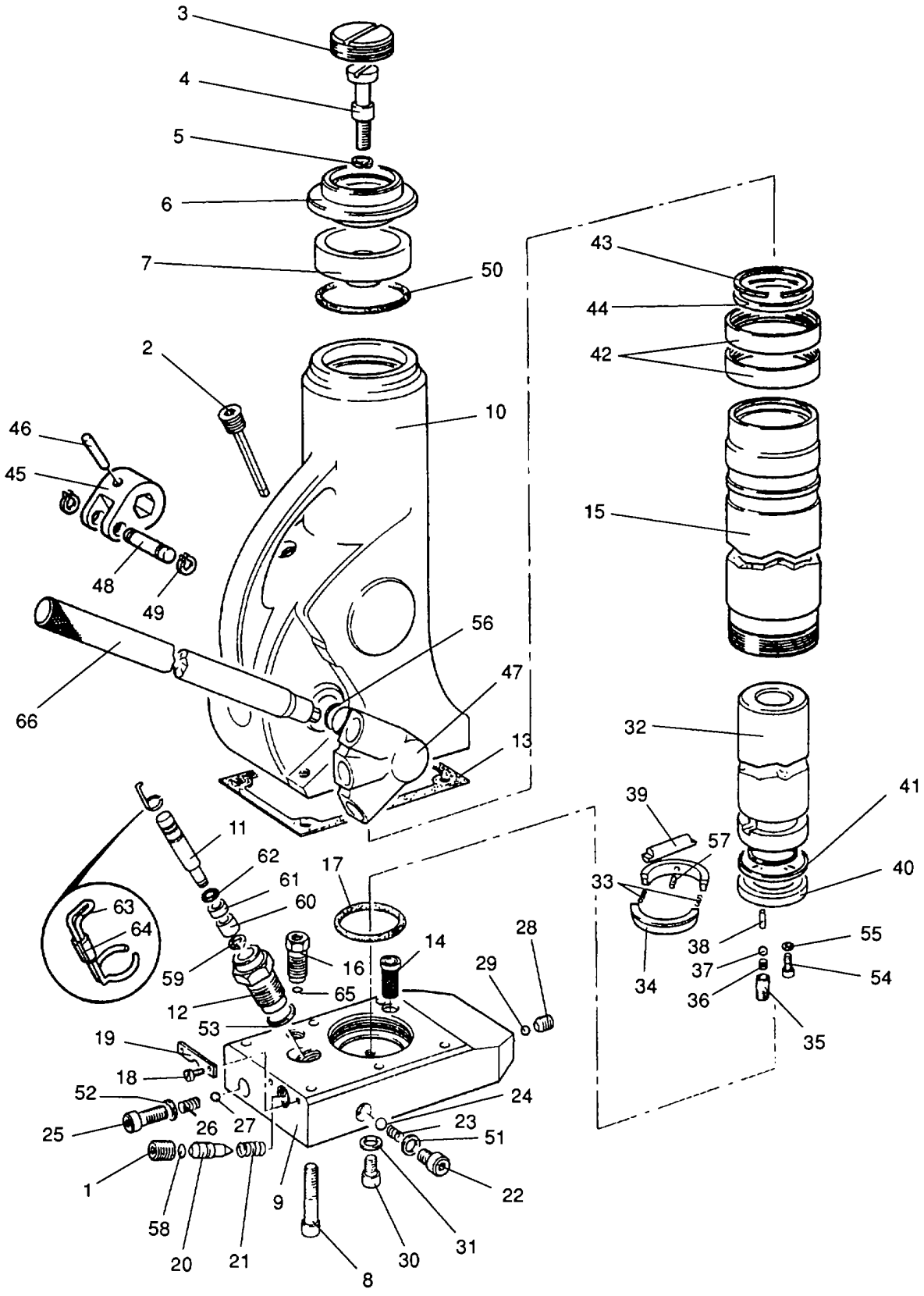
CAUTION

Do not allow cleaning solvent to come into contact with new seals or packing.

(1) Remove and clean off all residue of base gasket from base and body.
(2) Clean all components in a bath of solvent with a brush, then dry thoroughly with compressed air.
(3) Blow through oil-ways in base, vent pipe, trip valve cage (35) and pressure relief valve body (16), with compressed air.
(4) Clean filter (14) and blow through with compressed air.

c. Inspection

(1) Inspect dipstick/filler screw (2) keeper plate (3), swivel cradle (6) and swivel cradle seat (7) for damage and burrs. Check for bent cap pin (4), and security of dipstick in filler screw. Inspect lockwasher (5) and replace if damaged or missing.
(2) Inspect release valve screw (1), spring (21) and release valve (20) for damage.
(3) Inspect delivery valve screw (22), spring (23) and ball bearing (24) and also the flat washer (51) for damage.
(4) Inspect suction valve screw (25), spring (26) and ball bearing (27) and also the flat washer (52) for damage.
(5) Examine the threads on the six base screws (8) for wear and check that screws are not bent.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(6) Inspect seating on base (9) and body (10) for damage and liner bore for wear and damage.
(7) Inspect all threads and oilways for dirt, damage and wear.
(8) Inspect quadrant jack holes (47) for wear and cracking and hole through body (10) for wear.
(9) Inspect body (10) generally for damage, particularly around top.
(10) Inspect tumbler (45), grooved pin (48) and circlips (49) for wear and obvious damage.
(11) Examine pump barrel bore (12) and pump plunger body (11) for scoring and flat washer (53) for damage.
(12) Inspect liner (15) and ram (32) for scoring and wear. Put straight edge on liner to check for deformity.
(13) Inspect all valve seats for wear and damage.
(14) Inspect lifter pin (38), ball (37), spring (36) and trip bar (39) for wear and damage.
(15) Inspect ram plug screw (54) and ram plug joint (55) for security.
(16) Examine hole in base of ram to ensure that lifter pin (38) can move freely up and down.

d. Assembly

NOTE

Replace all seals (except flat washers 51, 52 and 53 which need only be replaced If damaged) and smear all seals and mating surfaces with oil before assembly. Fit all conical springs with small end towards ball.

(1) Remove the old quadrant seal (56) and replace with new.
(2) Turn body (10) upside down, then insert quadrant (47) and place tumbler assembly (45) on shaft.

NOTE

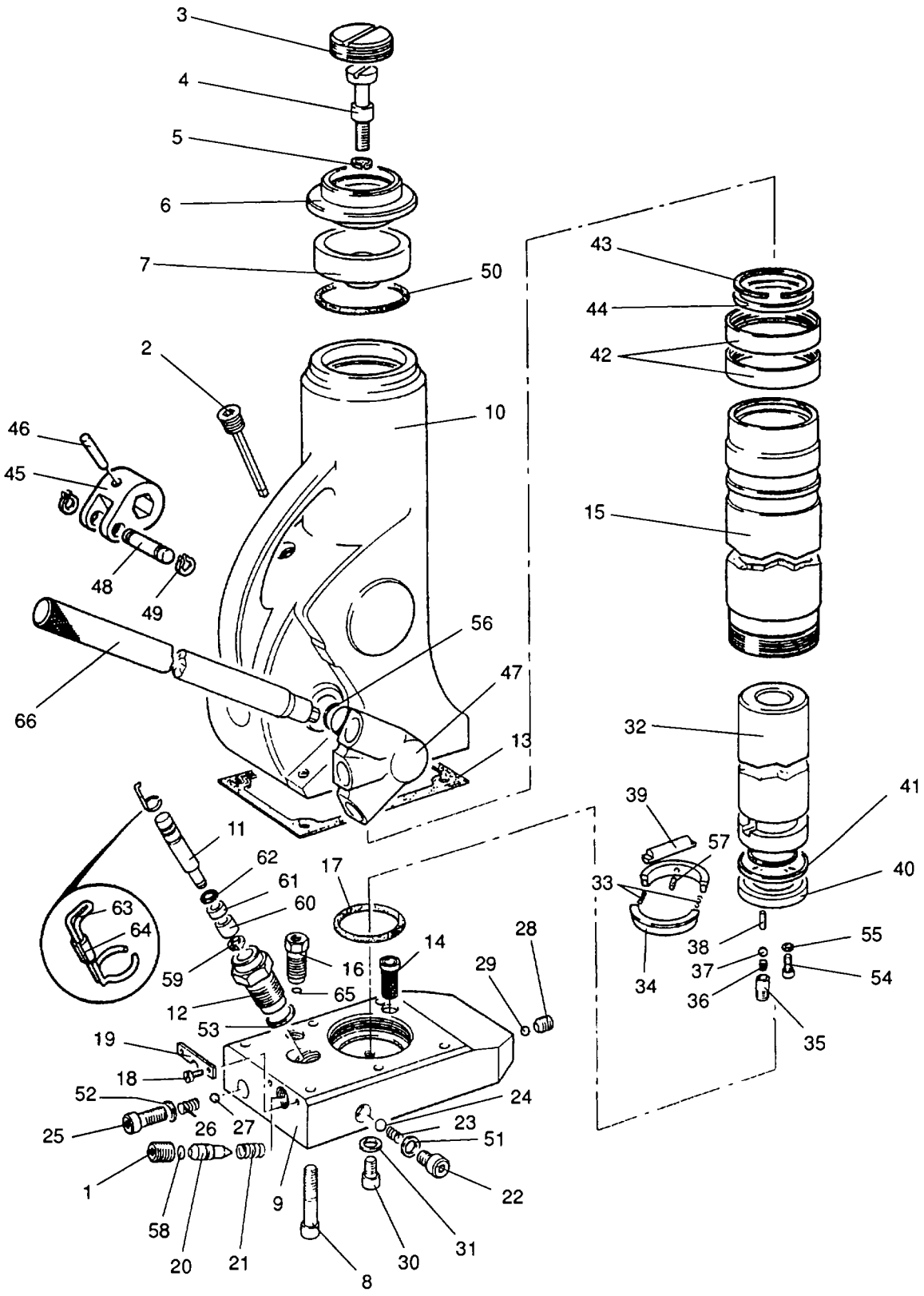
Ensure tumbler lines up with marks on body previously scribed. Ensure that quadrant is pressed fully in before driving spring pin, so that it seats in groove on quadrant shaft.

(3) Drive in spring pin (46) through tumbler to secure it on shaft.
(4) Turn body right way up and insert sealing ring (50) into groove inside top of body.
(5) Replace gaiter seals (42) on ram liner (15) with smooth side facing outward.

NOTE

Ensure that seal is fitted with wiper edge (sharp edge) uppermost.

(6) Replace wiper ring (44) and retaining ring (43).
(7) Stand ram (32) upside down so that ram packing (40) and A.E ring (41) can be fitted.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(8) Place A.E ring (41) in position on ram with flat side downward to ram.
(9) Work ram packing (40) into ram (32) until it locates correctly under flange.
(10) Insert trip bar (39), through hole in ram (32), with holes uppermost.
(11) Assemble lifter pin (38), ball bearing (37), spring (36) and trip valve cage (35) in hole, and screw trip valve cage into ram until firmly seated.
(12) Locate control rings (34) and springs (33) in control spring groove, ensuring pins (57) have located in mating holes.

NOTE

Ensure control rings are fitted with chamfered edge towards ram packing. If fitted correctly, trip bar will protrude over chamfered edge of control spring.

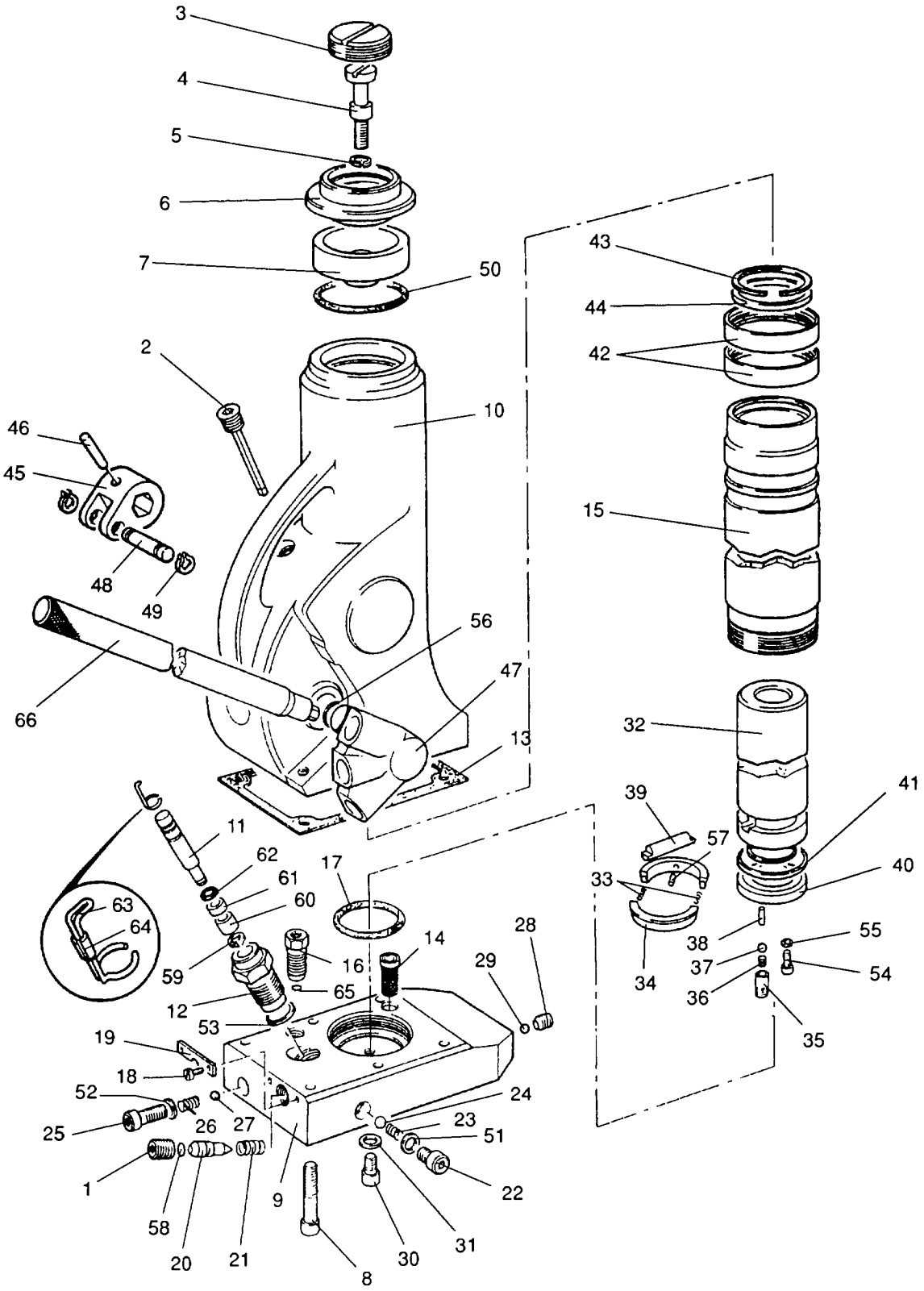
(13) Smear oil on ram (32) and inside of liner (15).

CAUTION
Ensure that A.E ring does not damage edge of liner bore.

(14) Holding control rings (34) closed, insert upper part of ram (32) into liner (15) until control rings are just located in bore, then carefully feed A.E ring (41) into liner bore with ram packing (40).
(15) Fit base plug (30) and base plug seal (31) and tighten to 50 ft lb. Fit grub screw (28) and ball bearing (29) in base and tighten to 50 ft lb.
(16) If flat washer (52) was found damaged on inspection, replace with new item, then assemble ball bearing (27), spring (26) and screw (25) and tighten to 50 ft lb.
(17) If flat washer (51) was found damaged on inspection replace with new item, then assemble ball bearing (24), spring (23) and screw (22) and tighten to 50 ft lb.
(18) Replace sealing ring (58) on release valve (20), then insert spring (21), release valve (20) and release valve screw (1) and tighten, hand tight only.
(19) Replace release valve instruction plate (19) and secure with screws (18).
(20) If flat washer (53) was found damaged on inspection, replace with new item, then screw pump barrel (12) into base and tighten to 90 ft lb.

NOTE
Ensure seal (61) has flat side towards nylon washer (62).

(21) Remove circlip (59), retaining sleeve packing (60), seal (61) and A.E ring (62). Replace A.E ring (62) and seal (61) from plunger (11).
(22) Assemble retaining sleeve packing (60) and circlip (59).
(23) If retaining clip (63) requires replacing, lock with clip ferrule (64) or locking wire.
(24) Fit plunger assembly into pump barrel (12) until lower groove is flush with top of barrel.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CAUTION
Do not disassemble pressure relief valve (16).

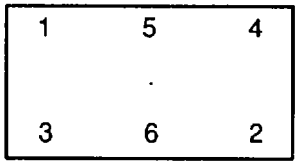
(25) Replace sealing ring (65) and screw in relief valve body (16). Do not use Allen key on internal hexagon as this disassembles pressure relief valve. Use box wrench on outer hexagon.
(26) Fit new sealing ring (17) into base then screw liner (15) into base and tighten to 75 ft lb.
(27) Refit filter (14) and fit new base gasket (13). Do not use gasket sealant.
(28) Ensure that lower groove in plunger (11) is flush with top of barrel (12), then with assembled base and liner flat on bench with toe pointing away from you, lift body (10) with left hand, and holding quadrant (47) in upper position with right hand, carefully lower body over liner at an angle of approximately 45° so it does not interfere with plunger.
(29) When body has cleared plunger, lower it down square to base, and allow it to rest lightly on sealing ring (50) with quadrant still held in upper position. This will allow the body to rock backwards and forwards.
(30) Push the body to its foremost position then slowly push quadrant into lower position then pull body backwards approximately 1/2 in (12 mm).

NOTE
Grooved pin (48) should now be located under retaining clip (63).

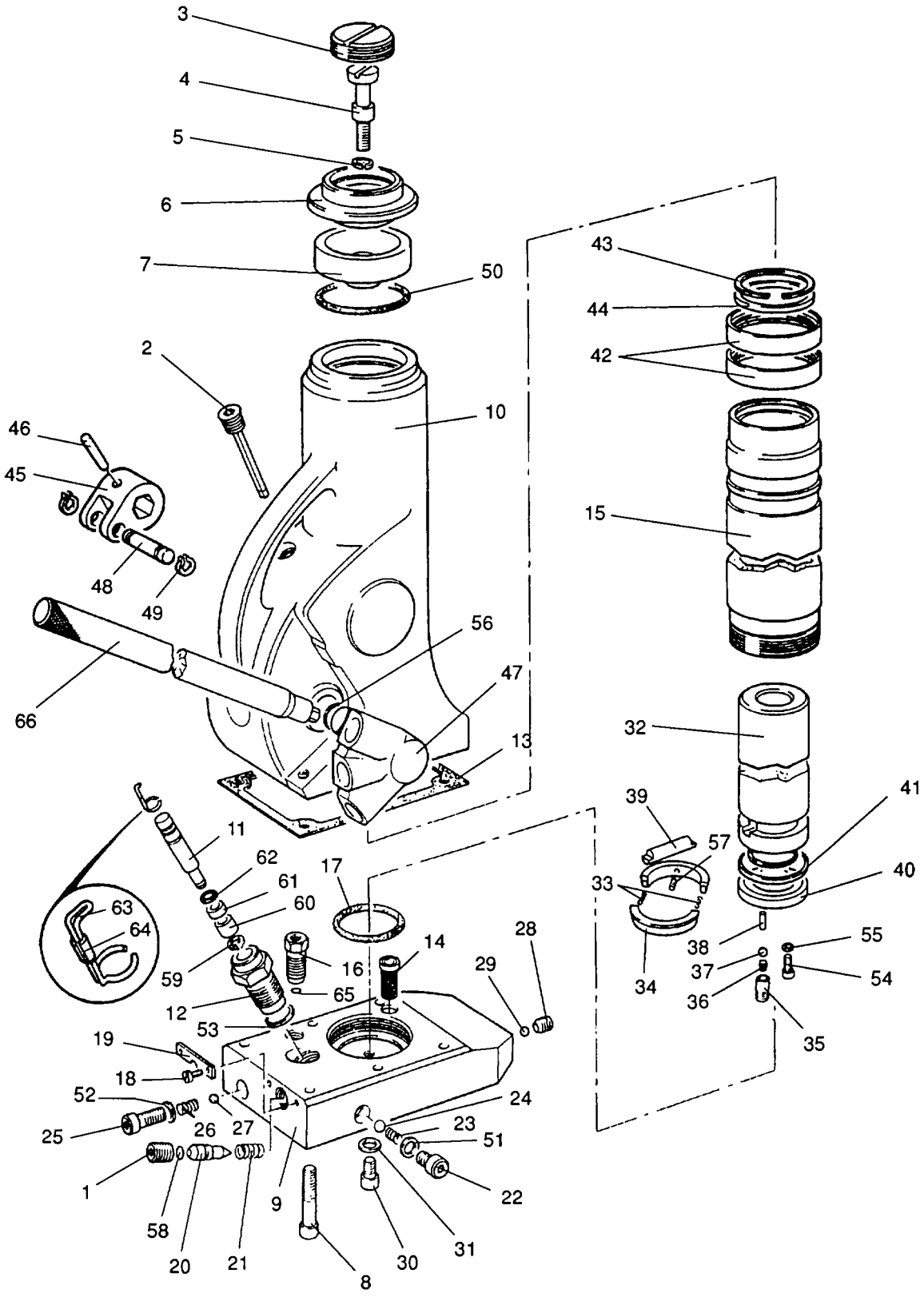
(31) Still holding body in backward position strike top of body with plastic mallet to enable it to ride over seal and drop onto base gasket (13).

NOTE
To check for correct assembly operate quadrant up and down several times and listen for air, pulsing from pump, at oil filler hole.

(32) Fit the six base screws (8) and tighten sequentially to 65 ft lb.



(33) Assemble swivel head seat (7), swivel cradle (6), lock washer (5) and cap pin (4). Tighten cap pin.
(34) Replace keeper plate (3) but do not overtighten.
(35) Fill with fresh, clean oil, approximately 2 5/8 pints (1 1/2 liters), 1 in (25 mm) above mark on dipstick.
(36) Replace dipstick.
(37) Remove any air from jack as follows:
  (a) Tighten release valve screw (1).
  (b) Insert operating handle (66) into quadrant (47).
  (c) Operate pump until ram has risen approximately 3 in (76 mm).
  (d) Unscrew release valve screw (1) no more than 1 to 1 1/2 turns.
  (e) Push down ram as far as it will go. Listen for air.
  (f) Repeat steps (a) to (e) until all air has been expelled.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e. Testing

All tests shall be carried out as detailed below.

(1) Acceptance Test

(a) Close release valve screw (1).

(b) Insert operating handle into quadrant, and pump jack until ram is fully extended approximately 12 in (300 mm). Trip valve has operated if jack can still be pumped after end of ram stroke. (Oil will only be circulated back into reservoir. Some oil may appear at top of liner).

(c) Jack must pump freely throughout full stroke of operating handle.

(d) Open release valve and ensure that ram fully retracts; close release valve.

(e) Using the operating lever extend the ram approximately 2 in (50 mm), then position the jack under a test rig and continue using the operating lever until the test rig load indicator reads 20 ton (the rated load for the jack). Continue pumping until the load indicator reads 22 tons at which point the relief valve should operate.

(f) Use the test rig to apply a further load of 3 tons making a total of 25 tons (which is the rated load plus 25% excess). Maintain this for a minimum time of 15 minutes.

(g) Visually check for oil leaks at the following points:

1 Joint between housing (10) and base (9).
2 Quadrant shaft seal (56).
3 Release valve screw (1).
4 Suction valve screw (25).
5 Delivery valve screw (22).
6 Grub screw (28) and base plug (30).

(h) Open release valve and ensure ram fully retracts; close relief valve.

(i) Position jack beneath small load, between 2 and 4 tons, and extend ram approximately 6 in (152 mm). Jack must support load for 20 to 30 seconds.

(j) Visually check for oil leaks as detailed in step (g) above.

(2) Storage Test

After successful completion of Acceptance test in (1) above, a two day storage test shall be carried out as detailed below. An ambient temperature of 100^{o}F (37.7^{o}C) shall be maintained throughout the test.

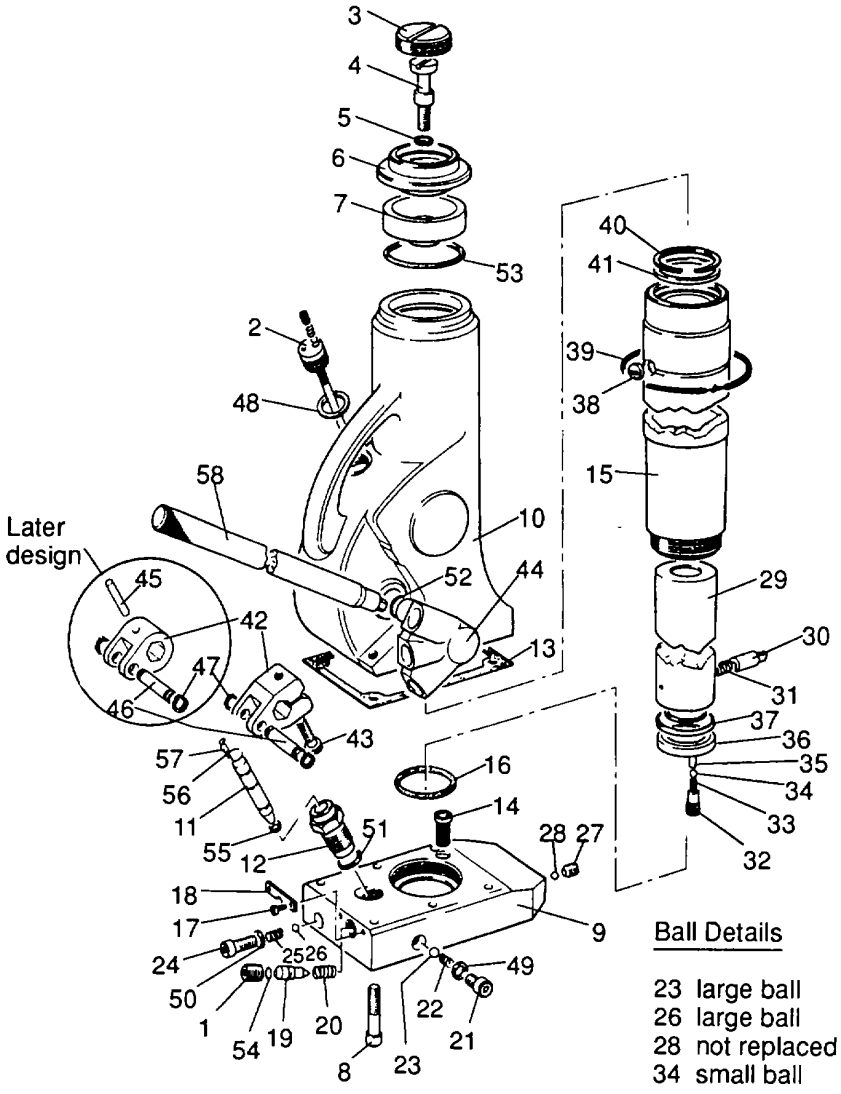
(a) Check oil level and fill up if necessary.

(b) Tighten filler cap and remove any surplus oil from all external surfaces.

(c) Ensure that ram is fully retracted.

(d) Lay jack down on its side with filler cap UPPERMOST.

(e) Place a sheet of standard duplication (copying) paper (80 gm/m^2) under the jack and directly beneath the filler cap, as a leak indicator.
(f) Check paper after 48 hours for an oil stain. If stain is present, measure the diameter.
(g) If mean diameter is 3.9 in (100 mm) or less, jack is acceptable and no further testing is necessary.
(h) If stain is above mean diameter in (g) above, keep jack under observation for a further 48 hours.
(i) If stain does not increase in size by more than 10% during the further 48 hour period, the jack is acceptable.
(j) If oil stain has increased by more than 10% in the further 48 hour period, the jack shall be rebuilt with new seals and gaskets. It must then be re-submitted for testing as detailed in paragraph e. (1) and (2).
(k) If oil stain has increased by more than 10% in the further 48 hour period, the jack shall be rebuilt with new seals and gaskets. It must then be re-submitted for testing as detailed in paragraph e. (1) and (2).



3-11 LANDING ROLLER

This task covers:

a. Disassembly **b. Inspection** **c. Repair** **d. Assembly**

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
2 caliper face wrenches (9, Appendix B, Section III)
Protective gloves

Materials Required

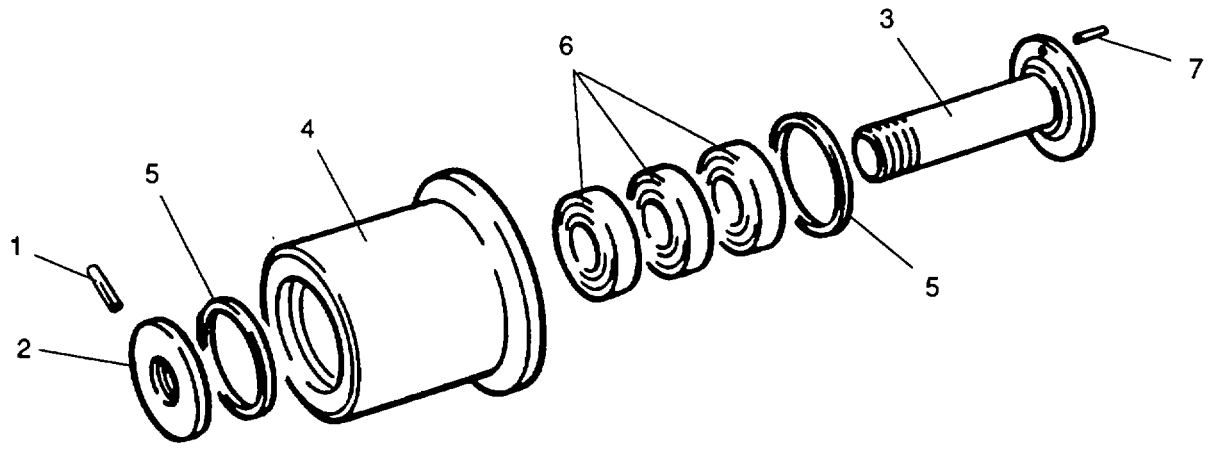
Grease, (1, Appendix C)
Cleaning solvent (3, Appendix C)
Crocus cloth (10, Appendix C)
Clean cloths
Boiling water in container large enough to submerge roller

Equipment Conditions

Roller assembly removed from landing roller (para. 2-22) and placed on raised flat surface.

a. Disassembly

WARNING
Components suspended In boiling water can cause severe burns. Always use protective gloves.



(1) Remove spring pin (1).
(2) Unscrew and remove flanged nut (2) from flanged sleeve (3) using caliper face wrenches.

(3) Remove flat washer (5), roller (4) and the other flat washer (5) from sleeve.
(4) Immerse roller (4) in boiling water for 5 minutes, then remove.
(5) Tap roller (4) down firmly on bench, bearings (6) will slide out.
(6) If spring pin (7) is damaged remove from flanged sleeve (3).

WARNING

Cleaning solvent is toxic and flammable. Use only in a well ventilated area and avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use In excessive amounts and avoid skin contact.

b. Inspection

(1) Clean parts with solvent and dry with clean cloth.
(2) Inspect all parts for wear and damage.

c. Repair

(1) Remove any light burrs from roller (4) with crocus cloth provided that roller is serviceable.
(2) Replace parts that are worn or damaged.

d. Assembly

(1) Check that all parts are clean.
(2) Immerse roller (4) in boiling water for 5 minutes, remove, then slide bearings (6) into roller.

NOTE

Wiping lip of seal on each outer bearing should face outward.

(3) When cool pack bearings (6) with clean, fresh grease.
(4) Place flat washer (5) over flanged sleeve (3) and insert sleeve through roller (4), then fit the other flat washer (5) on flanged sleeve (3).
(5) Screw flanged nut (2) onto flanged sleeve (3) with caliper face wrenches and tighten until spring pin holes are lined up.
(6) Drive spring pin (1) into position ensuring that it does not protrude into inner bore of sleeve.
(7) Spin roller to ensure freedom of movement then fit spring pin (7) in flanged sleeve (3).

3-12. LAUNCHING NOSE ROLLER, ROLLER ASSEMBLY

This task covers:

a. Disassembly b. Inspection c. Repair d. Assembly

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK) (1, Appendix B, Section III)
2 caliper face wrenches (9, Appendix B, Section III)
Protective gloves

Materials Required

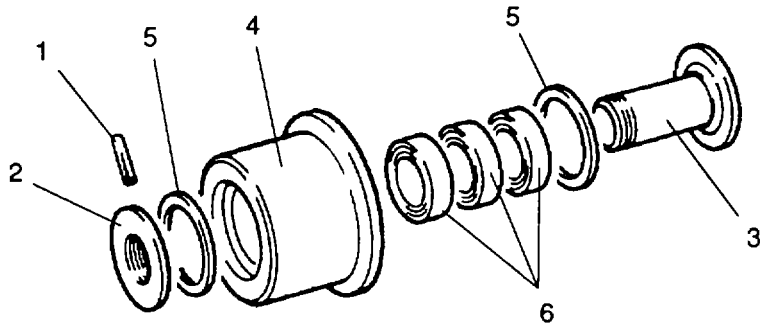
Grease, (1, Appendix C)
Cleaning solvent (3, Appendix C)
Clean cloths
Crocus cloth (10, Appendix C)
Boiling water in container large enough to submerge roller

Equipment Conditions

Roller assembly removed from launching nose (para. 2-29) and placed on raised, flat surface.

WARNING
Components suspended In boiling water can cause severe burns. Always use protective gloves.

a. Disassembly



(1) Remove spring pin (1).
(2) Unscrew and remove flanged nut (2) from flanged sleeve (3), using caliper face wrenches.

(3) Remove flat washer (5), roller (4) and the other washer (5) from sleeve.
(4) Immerse roller (4) in boiling water for 5 minutes, then remove.
(5) Tap down firmly endways on bench, bearings (6) will then slide out.

WARNING

Cleaning solvent is toxic and flammable. Use only in a well ventilated area and avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use In excessive amounts and avoid skin contact.

b. Inspection

(1) Clean parts with solvent and dry with clean cloth.
(2) Inspect all parts for wear and damage.

c. Repair

(1) Remove any light burrs from roller (4) with crocus cloth, provided that roller is serviceable.
(2) Replace parts that are worn or damaged.

d. Assembly

(1) Check that all parts are clean.
(2) Pack bearings with clean, fresh grease.
(3) Immerse roller (4) in boiling water for 5 minutes, then remove.

NOTE

Wiping lip of seal on each outer bearing should face outward.

(4) Slide bearings (6) into roller.

(5) Place washer (5) over flanged sleeve (3) and insert sleeve through roller, then fit another washer.

(6) Screw flanged nut (2) onto shaft and tighten with caliper face wrenches until spring pin holes are lined up.

(7) Drive spring pin (1) into position, ensuring that it does not protrude into inner bore of flanged sleeve.

(8) Spin roller to ensure freedom of movement.

3-13. ROCKING ROLLER

This task covers:

a. Removal b. Inspection c. Repair d. Installation

INITIAL SETUP:

Tools Required

Tool Kit, General Mechanic's, Automotive (GMTK), (1, Appendix B, Section III)
3/4 in drive impact wrench (15, Appendix B, Section III)
21/4 in deep well socket (16, Appendix B, Section III)
Caliper face wrench (9, Appendix B, Section III)
Slide hammer (10, Appendix B, Section III)
Box wrench combination (13, Appendix B, Section III)
Paint brushes
Shop Equipment, Common No. 1 (2, Appendix B, Section III)
Protective gloves

Materials Required

Jointing compound Celloseel (6, Appendix C)
Grease, (1, Appendix C)
Cleaning solvent (3, Appendix C)
Clean cloths
Crocus cloth (10, Appendix C)
Thread locking compound (4, Appendix C)
Adhesive Cement - Bostik Primer 9252, (23, Appendix C)
- Bostik Adhesive 2402 (24, Appendix C)
- Bostikure D Curing Agent D10 (25, Appendix C)
Boiling water in container large enough to submerge roller

Equipment Conditions

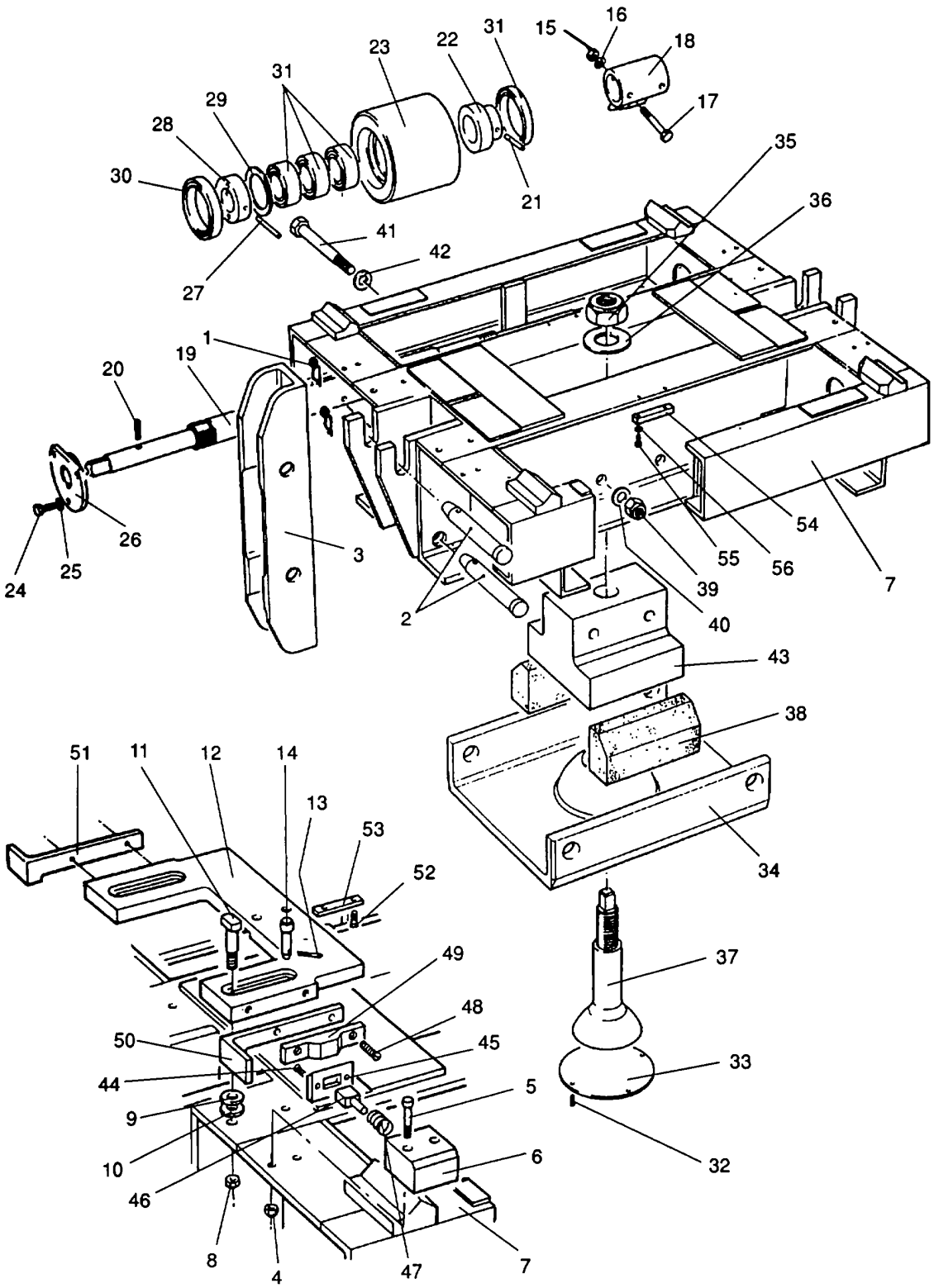
Rocking roller assembly on raised, flat surface.

WARNING

Components suspended In boiling water can cause severe burns. Always use protective gloves.

NOTE

This overhaul procedure does not include replacement of damaged shaft. If a shaft is obviously damaged, report the condition to Depot Maintenance.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a. Removal

(1) Remove panel pin clips (1) from bracing pins (2) securing link (3).
(2) Remove lock nuts (4) from socket cap screws (5) securing plunger housing (6) to frame (7).
(3) Remove nuts (8) and washers (9) and rubber washers (10) from pin (11) securing bearing plate (12), remove bearing plate.
(4) Remove split pin (13) from pin (14), then remove pin upwards.

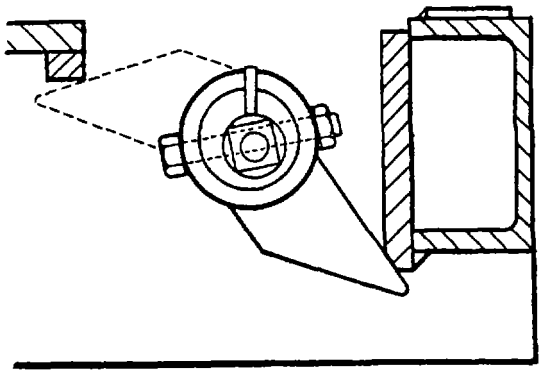
NOTE

Only disassemble and remove one shaft assembly at a time. On reassembly stops (18), flanged nuts (28) must be assembled in their original positions on the shaft (19), and the shaft Inserted in its original position and orientation in the frame (7). Therefore it is important to clearly mark the frame, shaft, flanged nuts and stops before disassembly.

(5) Remove nuts (15) and washers (16) from bolt (17) securing stop (18) to shaft (19).

NOTE

Mark which side of stop contacts rubber pad (54) for reference on assembly.



(6) Drive out indicator spring pins (20) at both ends of shaft.
(7) Drive out spring pin (21) from flanged sleeve (22) and move sleeve and roller (23) towards center of shaft.

NOTE

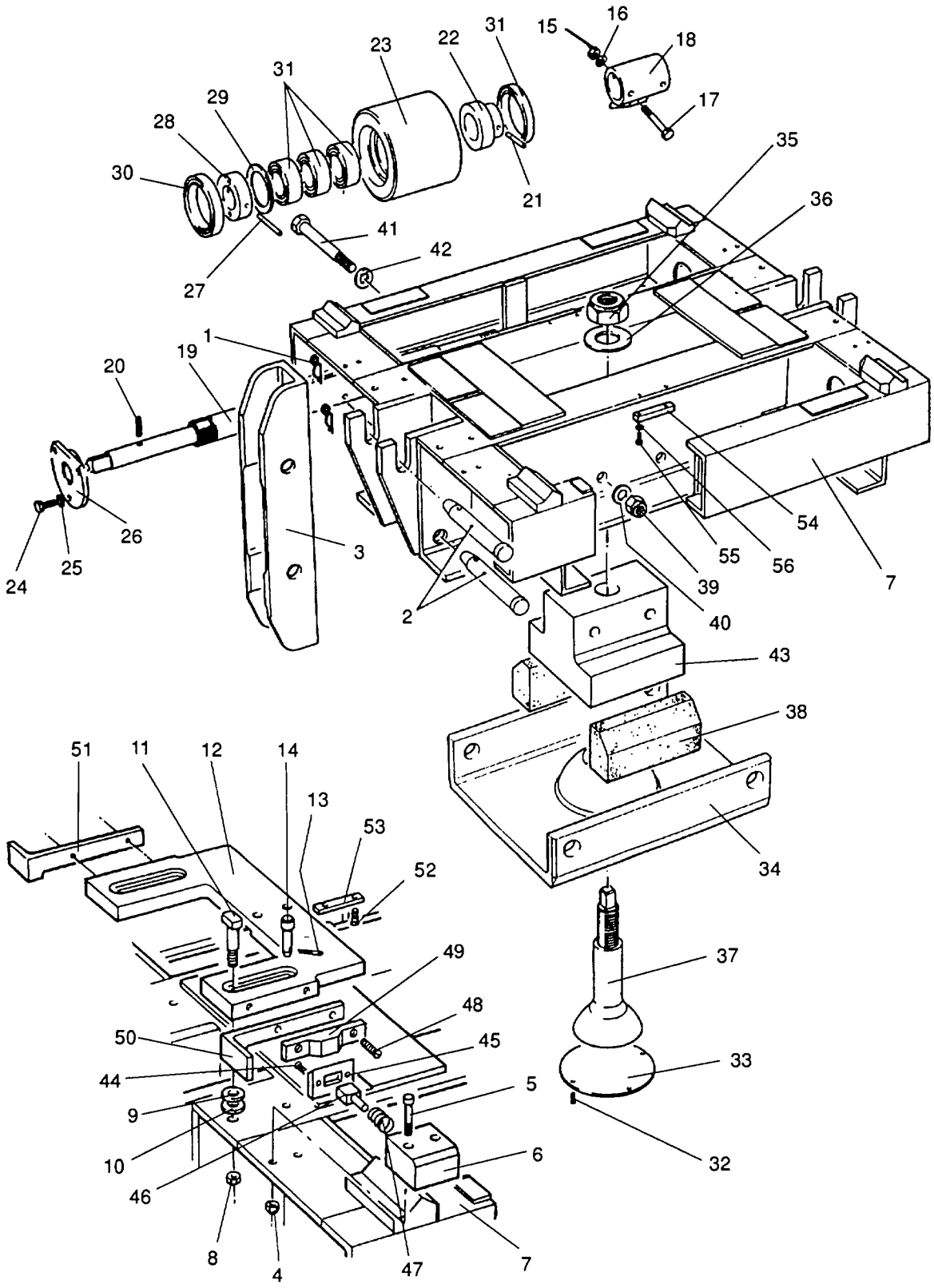
Roller assembly at opposite end of shaft is identical.

(8) Repeat step (7) for other roller.
(9) Remove screws (24) and washers (25) from bush assemblies (26) then remove bush assemblies from frame (7).

NOTE

Mark this flanged nut and shaft as mating parts when they are removed to ensure correct alignment on re-assembly.

(10) Drive out spring pin (27) from flanged nut (28) at one end of shaft only (L.H. end in illustration).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(11) Move shaft towards L.H. end of frame, and using caliper face wrench unscrew flanged nut (28) by gripping shaft with open-ended wrench.
(12) Withdraw shaft (19) through R.H. end of frame, collecting thrust washers (29), roller (23), flanged collars (22) and stop (18).

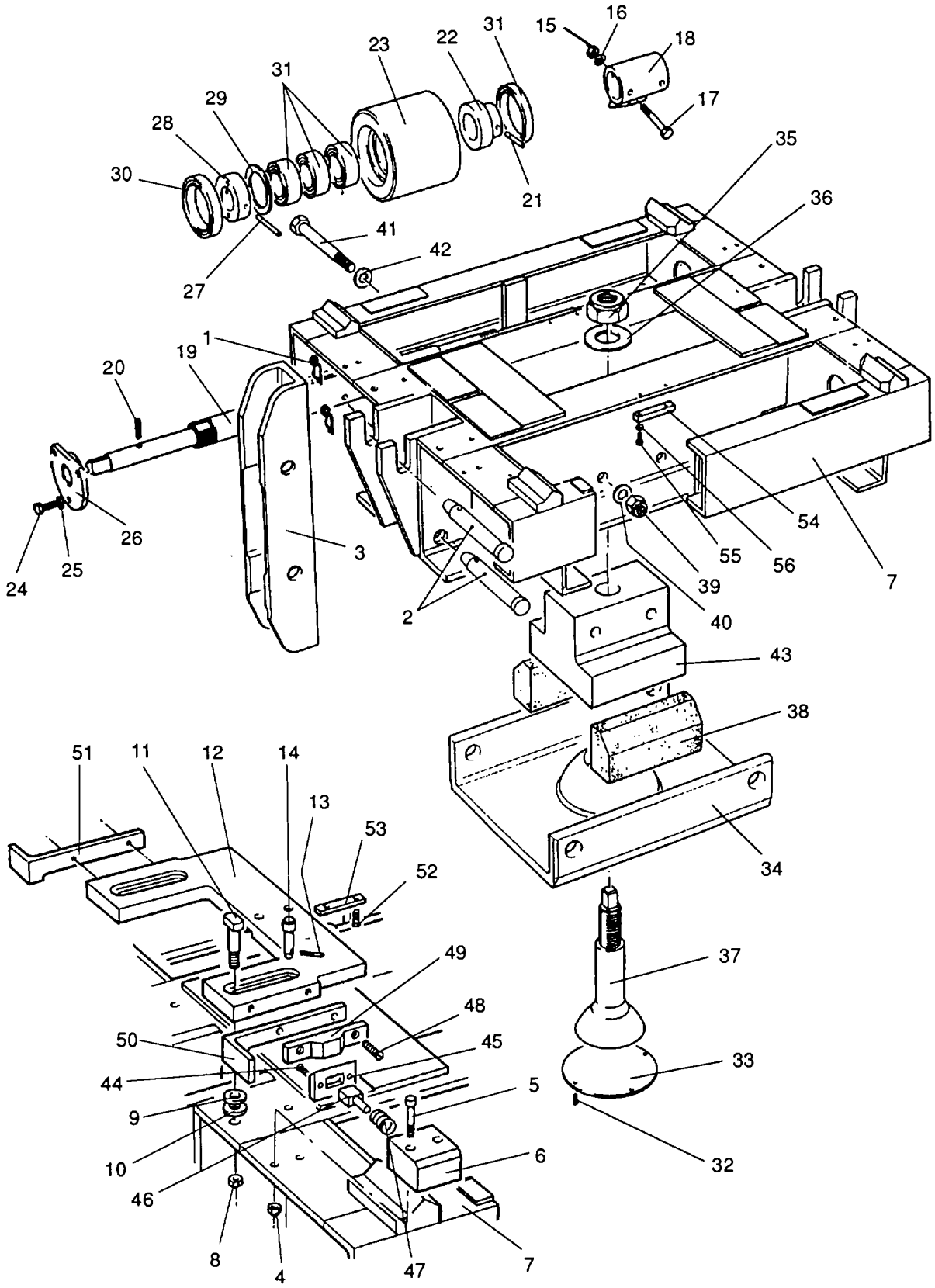
NOTE
R.H. roller inner bearing shells will remain on shaft with flanged nut (28).

(13) Having withdrawn shaft (19) use caliper face wrench to remove second flanged nut (28) and slide off the inner bearing shells.
(14) Use slide hammer to remove seals (30) from roller.
(15) Immerse roller (23) in boiling water for 5 minutes, then remove.
(16) Tap roller firmly down on bench, bearings (31) will slide out, then remove bearings.
(17) Repeat steps (1) to (16) for other shaft.
(18) Remove screws (32) from cover plate (33) and remove plate from pedestal (34).
(19) Remove nut (35) and washer (36) from pin (37) using 3/4 in drive impact wrench with 2 1/4 in deep well socket, then remove pedestal from pedestal assembly.
(20) Using sharp knife remove rubber supports (38), then remove nuts (39) and washers (40) from bolts (41).
(21) Withdraw bolts with washers (42) and remove block (43).

b. Inspection

WARNING
Cleaning solvent is toxic and flammable. Use only in well ventilated area and avoid prolonged breathing of fumes. Keep solvent away from flames. Do not use In excessive amounts and avoid skin contact.

(1) Clean all parts except seals, with solvent and dry with clean cloth.
(2) Inspect parts for wear and damage. Check protective coatings are not worn.
(3) In particular check that shaft is not bent. If shaft is bent or obviously damaged, report condition to depot maintenance. Check for burrs and damage to shoulders, square ends and threaded portions.
(4) Check inner bore of rollers for scoring.
(5) Inspect rubber pad (54) for wear and deterioration.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c. Repair

(1) Remove any light burrs from rollers (23) with crocus cloth.
(2) Replace seals (30), spring pins (20), (21) and (27), split pins (13), and self locking nuts (4), (9), (15), (35) and (39).
(3) If after inspection of plunger housing (6), damage/wear was found, remove screws (44), plate (45), plunger (46) and spring (47) replacing parts as necessary.
(4) If after inspection of bearing plate assembly (12) damage was apparent, remove screws (48) securing brackets (50) and (51), and cams (49).
(5) If after inspection of key (53) wear/damage was found, remove screws (52) and key (53) replacing as necessary.
(6) If after inspection of rubber pad (54) wear/deterioration was found, remove screws (55) and washers (56), then remove rubber pad.

d. Installation

WARNING

Jointing and sealing compounds are toxic and flammable. Use only in a well ventilated area and avoid prolonged breathing of fumes. Keep away from flames. Do not use in excessive amounts. Avoid skin contact, eye contact and Ingestion.

(1) Apply jointing compound to mating surfaces of block (43) and frame (7).
(2) Secure block in position with bolts (41), washers (42) and (40) and nut (39).
(3) Stir adhesive primer thoroughly, then brush apply a thin coat to mating surfaces of rubber supports (38) and frame (7), and allow to dry for a minimum period of one hour.
(4) Mix together thoroughly for 5 minutes, adhesive cement and curing agent in the proportions as supplied or, by weight, 100 parts adhesive and 6 parts curing agent and apply an even coat to both mating surfaces by brush, roller or serrated trowel.

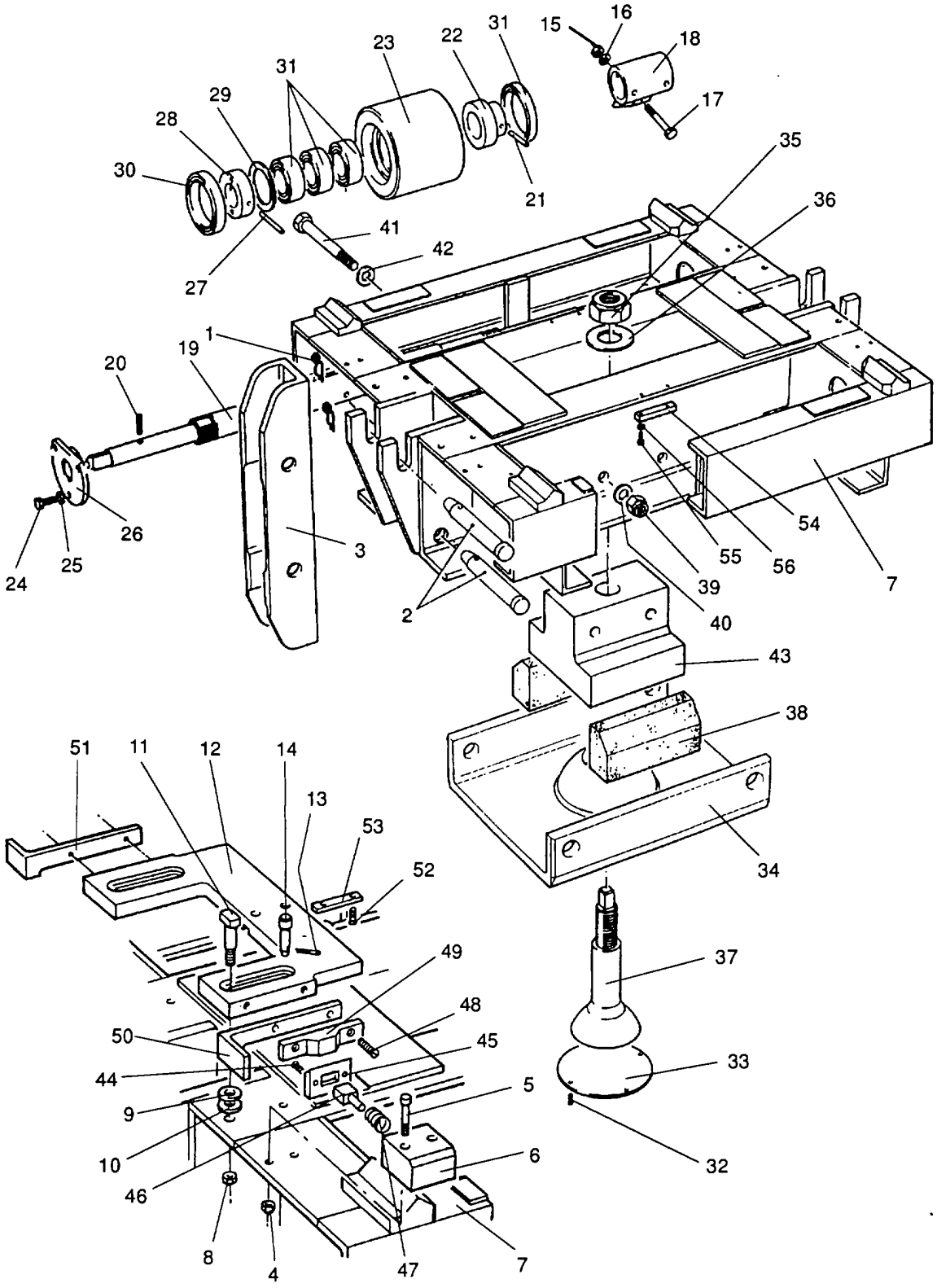
CAUTION

Ensure alignment of rubber with weld reinforced area of frame.

NOTE

Two coats are preferable for maximum adhesion, in which case the first coat should dry for 20 to 30 minutes before applying the second coat and allowing this to dry for 5 to 15 minutes.

(5) Allow the adhesive to dry for 5 to 15 minutes or until it can be just touched with knuckles without any transference of adhesive.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(6) Join the frame (7), and rubber blocks (38) together, with as much force as possible and leave for 10 to 20 minutes.
(7) Lift pedestal (34) into position together with pin (37).
(8) Assemble washer (36) and self locking nut (35). Using box wrench combination tighten nut until pin (37) is solid in pedestal, then back off 1/4 turn to allow movement between pedestal (34) and block (43).

NOTE
Threads should be flush with top of frame and not protruding.

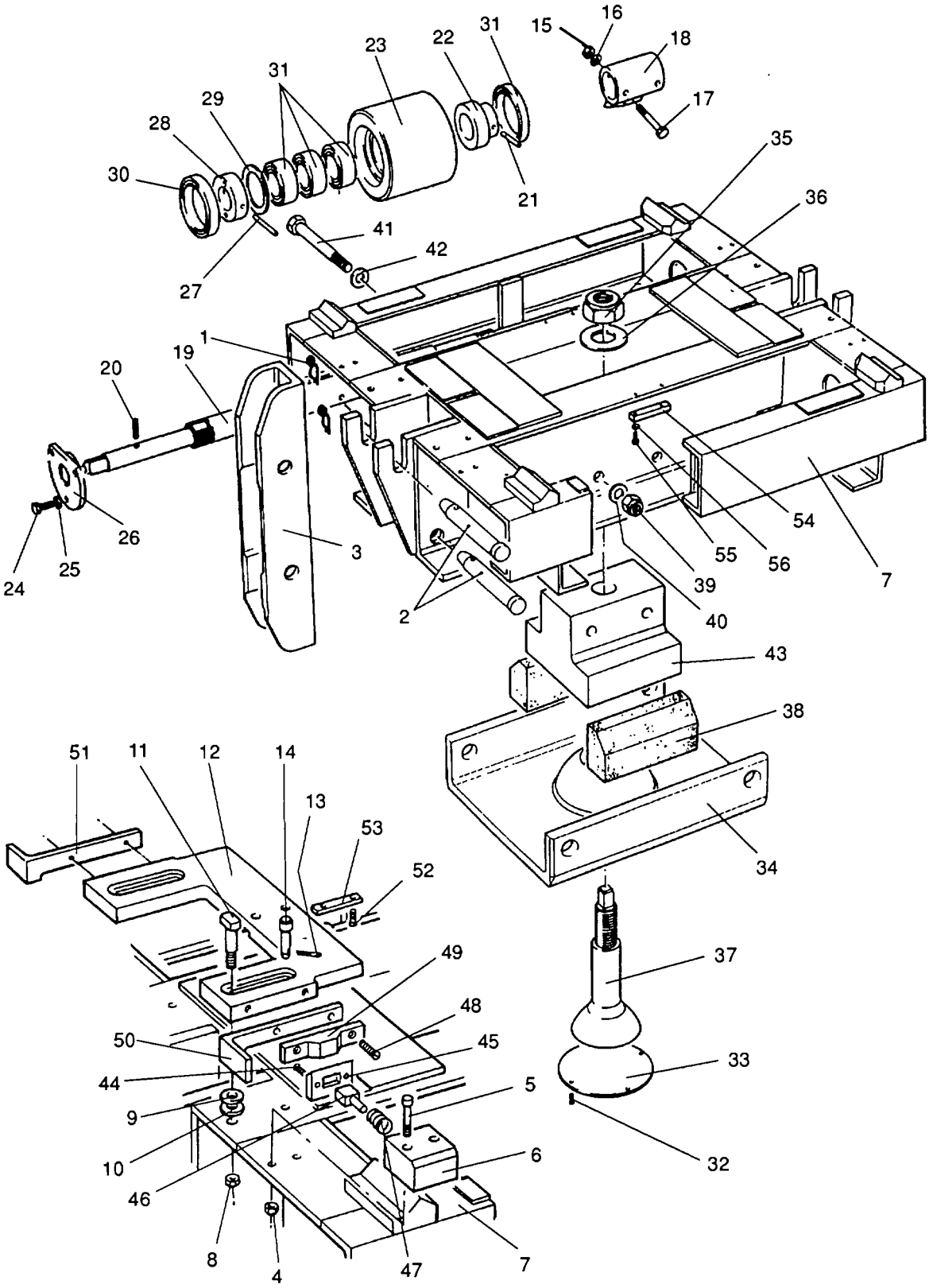
(9) Fit rubber pad (54) with washer (56) and screw (55), applying thread locking compound to screw threads before fitting.

NOTE
Before Installation of shaft assembly check markings on stops (18), flanged nuts (28), shaft (19) and frame (7) to ensure components are assembled In their original positions.

(10) Remove inner bearing shells from bearings (31). Pack bearings with clean, fresh grease and grease washers (29).
(11) Immerse rollers (23) in boiling water for 5 minutes, remove then insert bearings.
(12) Insert thrust washers (29) into rollers ensuring they fit flat in the recess up against the roller bearings.
(13) With shaft (19) held securely, place inner bearing shells over one end and lock in place with flanged nut (28).
(14) Tighten and adjust flanged nut (28) until hole lines up with hole in shaft, then drive pin (27) into place.

NOTE
Ensure that wiper seals on two outer bearings are facing outwards.

(15) Fit seals (30) either end of roller, by pressing them in, in a vise with protective plates positioned over the seals. Only fit one seal at a time and grease outer diameter of seal to ease assembly.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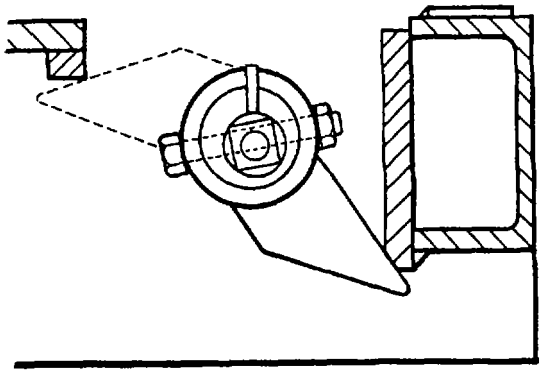
(16) Insert shaft through hole in frame (7), then slide roller assembly (23) and slide collar (22) onto the shaft.
(17) Fit stop (18) on shaft ensuring that correct face of stop as previously marked, contacts rubber pad (54).



(18) Continue assembly of shaft by fitting second slide collar(22), inner bearing shells and roller assembly (23).
(19) Now insert shaft through opposite hole in frame.
(20) Fit flanged nut (28) and ensure hole lines up with hole in shaft enabling pin (27) to be driven in.

NOTE
Coat threads of bolts with thread sealant before Inserting.

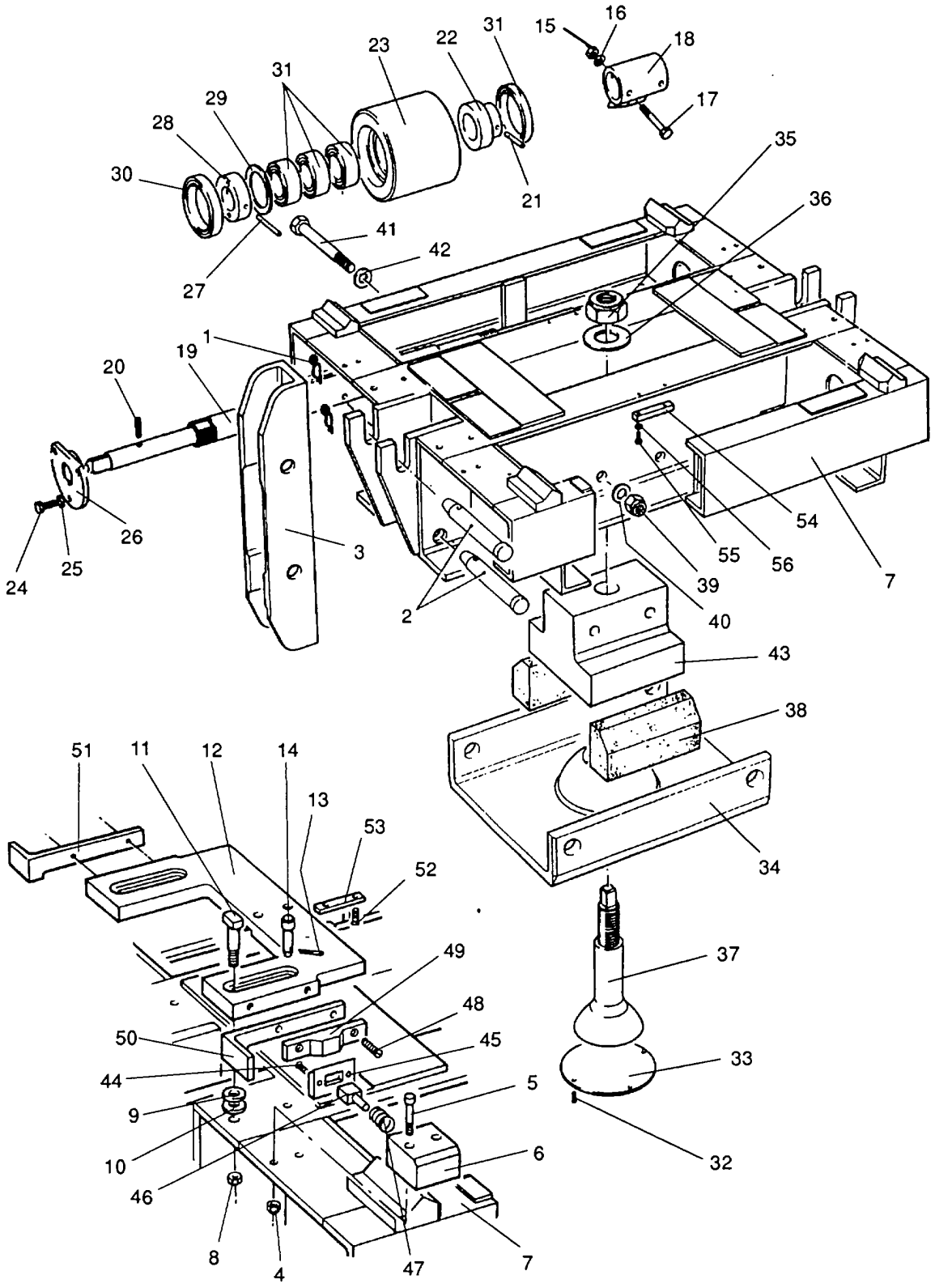
(21) Place bush assemblies (26) on shaft ends and secure with washers (25) and bolts (24).
(22) Slide roller (23) towards end of shaft until fully in position.

NOTE
Wiper seal (30) should now be positioned over flanged nut (28).

(23) Move slide collar (22) into position with pin holes aligned and fit pin (21).

NOTE
Second wiper seal (30) should now be over slide collar (22).

(24) Align holes in shaft (19) and stop (18), and fit bolt (17), washer (16) and nut (15).
(25) Insert indicator pins (20) at either end of shaft.
(26) Repeat steps (10) to (24), if necessary for assembly of other shaft.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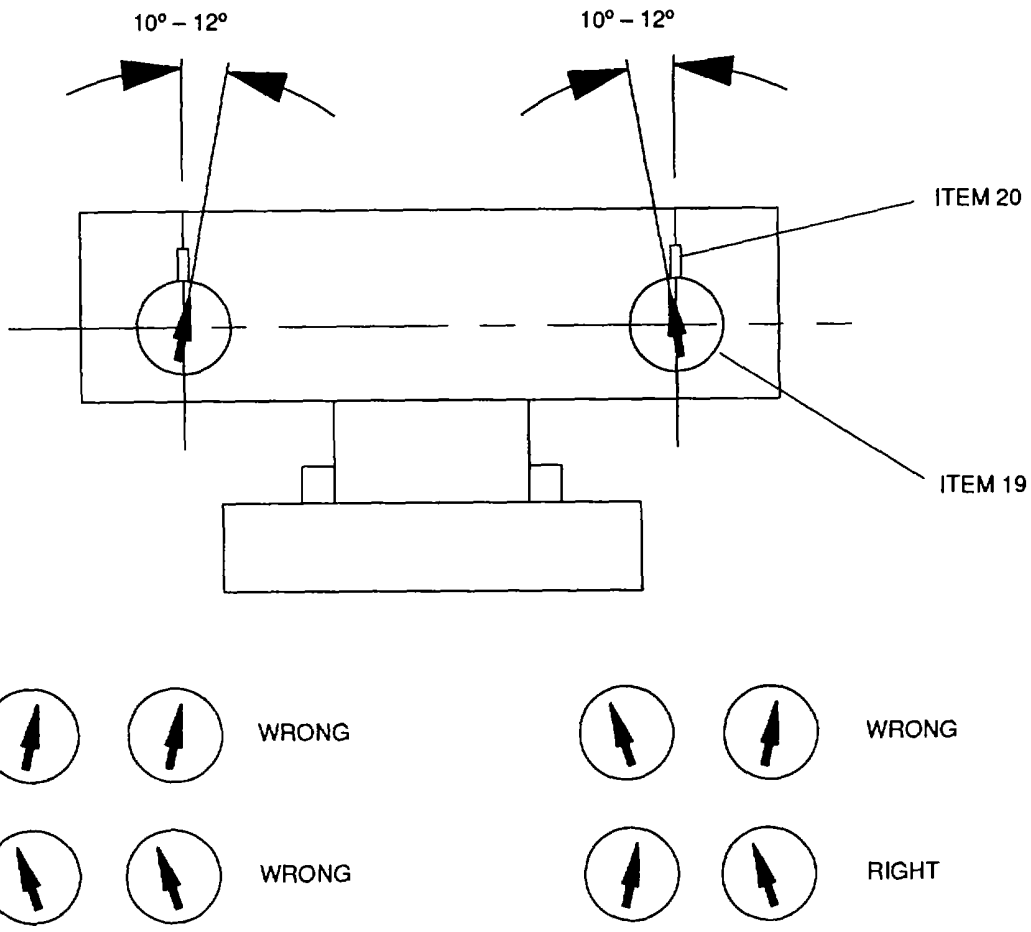
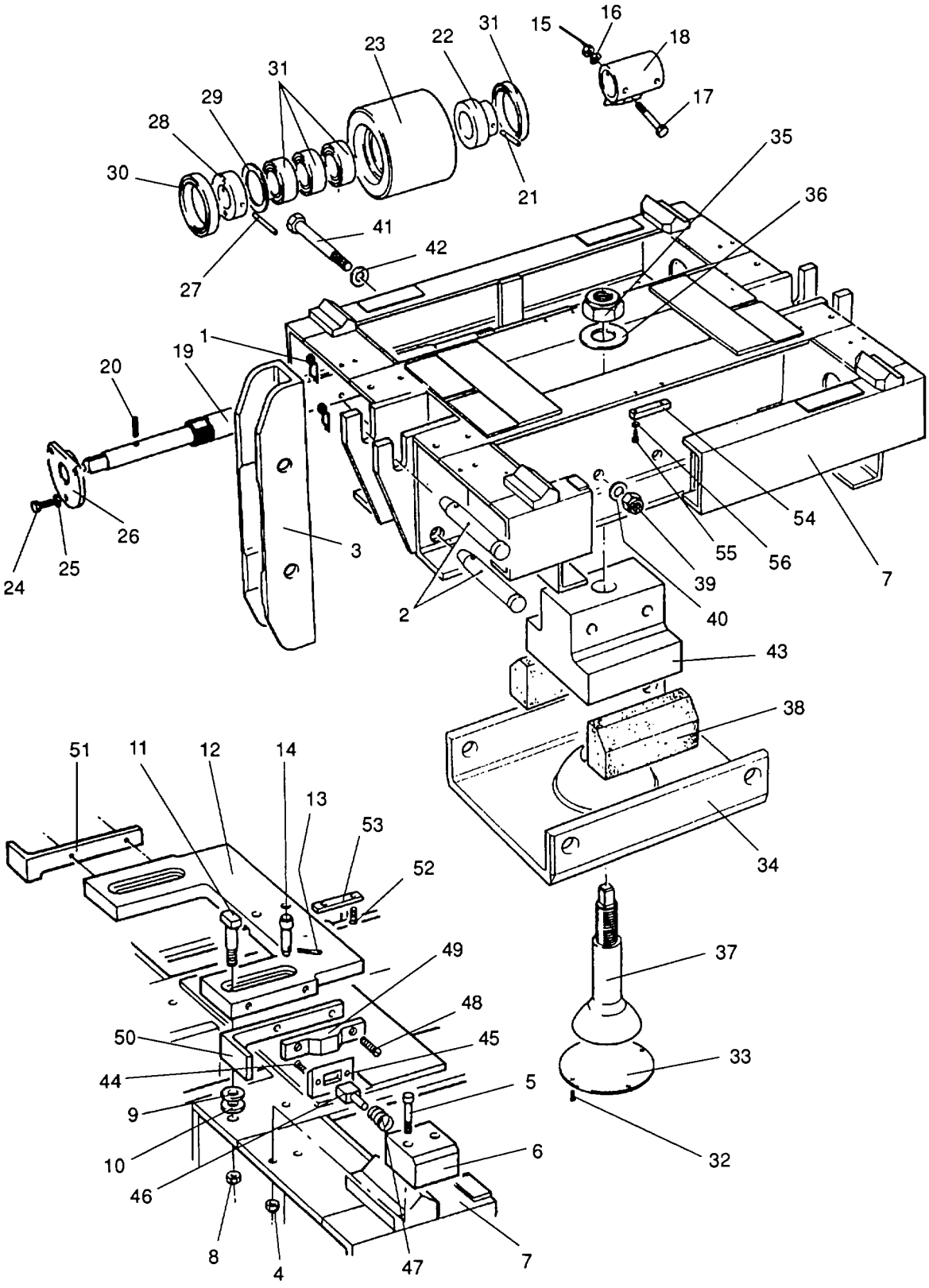


(27) Turn left hand shaft clockwise and right hand shaft anti-clockwise to contact stop then check arrows on end view of shafts to ensure shafts have been fitted correctly (see diagrams).
(28) Assemble cams (49) and brackets (50) and (51) onto bearing plate (12) and secure with screws (48).
(29) Assemble key (53) onto bearing plate and secure with screws (52).
(30) Fit pin (14) and secure with split pin (13); then fit bearing plate (12) and secure to frame with headed pins (11), washers (10) and (9) and nuts (8).
(31) Assemble plunger assembly (6) including spring (47), plunger (46), plate (45) with screws (44), greasing the spring before insertion.
(32) Mount plunger assembly in position on frame and secure with bolts (5), and lock nuts (4).
(33) Push bearing plate assembly fully in, and with the rollers in the up position place a straight edge across the top of the two rollers. Use feeler gauges to measure the gap between straight edge and bearing plate.
(34) Record the dimension which should be 0.075 in (1.9 mm) minimum.
(35) Position link (3) on frame and secure with bracing pins (2) and retainer clips (1).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Appendix A

REFERENCES

Publication Number	Title
AR190-11 & AR190-13	Security Procedures
DA FORM 2028-2	Recommended Changes to Technical Publications
DA FORM 2404	Equipment Inspection and Maintenance Worksheet
DA Pam 738-750	The Army Maintenance Management System
DMWR-5-5420-212	Depot Maintenance Work Requirement, Medium Girder Bridge, Including Bridge Set, Bridge Erection Set and Link Reinforcement Set
MCO 1650 17	US - Marine Corps Incentive Awards Program
MIL-C-104	Packaging Specification
MIL-P-116	Preservative Compound (Oil)
MIL-STD-129	Marking Specification
SF 368	Product Deficiency Report
TM 5-5420-212-10-1	Operators Manual, Medium Girder Bridge, Including Bridge Set, Bridge Erection Set and Link Reinforcement Set
TM 5-5420-212-10-2	Operators Manual, Medium Girder Bridge, Including Bridge Set, Bridge Erection Set and Link Reinforcement Set
TM -5420-212-23P	Repair Parts and Special Tools List (Including Depot Main tenance Repair Parts) Medium Girder Bridge, Including Bridge Set, Bridge Erection Set and Link Reinforcement Set
TM 43-0139	Painting Instructions for Army Materiel
TM 750-244-3	Procedures for Destruction of Equipment to Prevent Enemy Use (Mobility Equipment Command)

APPENDIX B
MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

THE ARMY MAINTENANCE SYSTEM (AMS)

This introduction provides a general explanation of all maintenance and repair functions authorized at the two maintenance levels under the Two-Level Maintenance System concept.

The MAC (immediately following the introduction) designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component shall be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column 4 as:

Field - includes two subcolumns, Unit C (operator/crew) and O (unit/organizational maintenance) and Direct Support (F) maintenance

Sustainment - includes two subcolumns, general support (H) and depot (D).

The tools and test equipment requirements (immediately following the MAC) list the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from the MAC.

The remarks (immediately following the tools and test equipment requirements) contain supplemental instructions and explanatory notes for a particular maintenance function.

MAINTENANCE FUNCTIONS

Maintenance functions are limited to and defined as follows:

1. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

2. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis, i.e., load testing of lift devices and hydrostatic testing of pressure hoses.

3. Service. Operations required periodically to keep an item in proper operating condition: e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

4. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.

5. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

MAINTENANCE FUNCTIONS - Continued

6. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments of test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

7. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

8. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and assigned maintenance level is shown as the third position code of the Source, Maintenance and Recoverability (SMR) code.

NOTE

The following definitions are applicable to the "repair" maintenance function:

Services. Inspect, test, service, adjust, align, calibrate, and/or replace.

Fault location/troubleshooting. The process of investigating and detecting the cause of equipment malfunctioning: the act of isolating a fault within a system or Unit Under Test (UUT).

Disassembly/assembly. The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

Actions. Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

9. Repair. The application of maintenance services, including fault location/troubleshooting, removal/installation, disassembly/assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

10. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

11. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (e.g., hours/miles) considered in classifying Army equipment/components.

EXPLANATION OF COLUMNS IN THE MAC

Column 1, Group Number. Column 1 lists FGC numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the Next Higher Assembly (NHA).

Column 2, Component/Assembly. Column 2 contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

Column 3, Maintenance Function. Column 3 lists the functions to be performed on the item listed in Column 2. (For a detailed explanation of these functions, refer to "Maintenance Functions" outlined above.)

EXPLANATION OF COLUMNS IN THE MAC - Continued

Column 4, Maintenance Level. Column 4 specifies each level of maintenance authorized to perform each function listed in Column 3, by indicating work time required (expressed as manhours in whole hours or decimals) in the appropriate subcolumn. This work time figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance levels, appropriate work time figures are to be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows:

Field:
C Operator or crew maintenance
O Unit maintenace
F Direct support maintenance

Sustainment:
H General support maintenance
D Depot maintenance

NOTE

The “L” maintenance level is not included in Column 4 of the MAC. Functions to this level of maintenance are identified by a work time figure in the “H” column of Column 4, and an associated reference code is used in the REMARKS Column 6. This code is keyed to the remarks and the SRA complete repair application is explained there.

Column 5, Tools and Equipment Reference Code. Column 5 specifies, by code, those common tool sets (not individual tools), common Test, Measurement and Diagnostic Equipment (TMDE), and special tools, special TMDE and special support equipment required to perform the designated function. Codes are keyed to the entries in the tools and test equipment table.

Column 6, Remarks Code. When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks table entries.

EXPLANATION OF COLUMNS IN THE TOOLS AND TEST EQUIPMENT REQUIPMENTS

Column 1, Tool or Test Equipment Reference Code. The tool or test equipment reference code correlates with a code used in Column 5 of the MAC.

Column 2, Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

Column 3, Nomenclature. Name or identification of the tool or test equipment.

Column 4, National Stock Number (NSN). The NSN of the tool or test equipment.

Column 5, Tool Number. The manufacturer's part number, model number, or type number.

Explanation of Columns in the Remarks

Column 1, Remarks Code. The code recorded in Column 6 of the MAC.

Column 2, Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC.

Section II. MAINTENANCE ALLOCATION CHART

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			Field			Sustainment			
			Unit		DS	GS	Depot		
			C	O	F	H	D		
00	Medium Girder Bridge System								
01	Bridge Set, Fixed,	Inspect		3.25			5.0		
0101	Marker, Bridge, Guide Assembly	Inspect		0.2				1	D
		Replace		0.1					
		Repair		0.1				1	E
0102	Curb, Assembly	Inspect		0.2			0.5		
		Replace		0.1					
		Repair					28.0		B
0103	Deck Unit, Bridging	Inspect		0.3			0.5		
		Replace		0.1					
		Repair					30.0		B, D
0104	Ramp Unit, Special (14 ft)	Inspect		0.3			0.5		
		Replace		0.1					
		Repair					131.0		B, D
0105	Ramp Unit, Bridge (Short)	Inspect		0.3			0.5		
		Replace		0.1					
		Repair					61.0		B, D
0106	Panel, End Taper, Bridge	Inspect		0.3			0.5		
		Replace		0.1					
		Repair		0.2			195.0	1	A,B,C,D
0107	Beam, Bankseat, Bridge	Inspect		0.3			0.5		
		Replace		0.2					
		Repair		0.2			199.0	1	A,B,C,D
0108	Brace, Sway	Inspect		0.2					
		Replace		0.1					
0109	Panel, Junction	Inspect		0.3			0.5		
		Replace		0.1					
		Repair		0.2			223.0	1	A,B,C,D
0110	Panel, Top, Bridge	Inspect		0.3			0.5		
		Replace		0.1					
		Repair		0.2			110.0	1	A,B,C,D

Section II. MAINTENANCE ALLOCATION CHART (continued)

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			Field			Sustainment			
			Unit		DS	GS	Depot		
			C	O	F	H	D		
0111	Panel, Bottom, Bridge	Inspect		0.3			0.5		
		Replace		0.2					
		Repair		0.5			138.0	1	A,B,C,D
0112	Pallet Assembly	Inspect		0.4			0.5		
		Replace		0.2					
		Repair		1.2			170.0	1, 2, 3	E
0113	Truck Mounting Equipment	Inspect		0.4					
		Replace		0.2					
		Repair		1.2				1, 2, 3	E
0114	Trailer Mounting Equipment	Inspect		0.4					
		Replace		0.2					
		Repair		1.5				1, 2, 3	
0115	Miscellaneous Pins, Equipment Bag	Inspect		0.3					
		Replace		0.1					
		Repair		0.1				1, 2, 3	D
	Miscellaneous Basket, Equipment	Inspect		0.4			0.5		
		Replace		0.2					
		Repair		1.2			170.0	1, 2, 3	E
02	Erection Set, Bridge	Inspect		3.0			4.0		
0201	Adapter Assembly, Push Bar (Not for HEMTT or CBT)	Inspect		0.2					
		Replace		0.1					
		Repair		0.3				1, 2, 3	E
0202	Panel Erection Aid, Bridge	Inspect		0.3			0.4		
		Replace		0.2					
		Repair		0.2			4.5	1	A, D
0203	Bar, Carrying	Inspect		0.2					
		Replace		0.1					
		Repair		0.3				1, 2, 3	E
0204	Roller Beam, Bridge	Inspect		0.4					
		Replace		0.2					
		Repair		0.3				1	A
0205	Cross Girder, Launching Nose, Bridge, Mk3	Inspect		0.4					
		Replace		0.2					
		Repair		0.4				1	A

Section II. MAINTENANCE ALLOCATION CHART (continued)

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			Field			Sustainment			
			Unit		DS	GS	Depot		
			C	O	F	H	D		
0206	Cross Girder, Building Frame, Bridge	Inspect		0.4				1	A
		Replace		0.2					
		Repair		0.4				1	A
0207	Longitudinal Girder, Building Frame, Bridge	Inspect		0.3					
		Replace		0.2					
0208	Cross Girder, Push Bar, Bridge	Inspect		0.3					
		Replace		0.2					
0209	Jack, Hydraulic, 20 Ton	Inspect		0.2					
		Service		0.1					
		Replace		0.2					
		Repair		1.5				1, 2, 3	F
0210	Launching Nose Unit, Heavy, Bridge	Inspect		0.4			0.5		
		Replace		0.2					
		Repair		0.4			5.5	1, 2, 3	A,B,C,D
0211	Launching Nose Unit, Light, Bridge, Front	Inspect		0.3			0.5		
		Replace		0.2					
		Repair					8.0	1, 2, 3	B
0212	Launching Nose Unit, Light, Bridge, Rear	Inspect		0.3			0.5		
		Replace		0.2					
0213	Pedestal, Landing Roller Mk1	Inspect		0.3			0.3		
		Replace		0.2					
		Repair					5.0	1, 2, 3	A, B, D
0214	Pedestal, Building, Bridge	Inspect		0.2			0.2		
		Replace		0.2					
		Repair					0.5		B
0215	Baseplate, Building Frame, Bridge	Inspect		0.2			0.3		
		Replace		0.2					
		Repair					5.0		B, D
0216	Baseplate, Roller Beam, Support (Single Story)	Inspect		0.2			0.3		
		Replace		0.2					
		Repair					2.5		B, D
0217	Post, Jacking, Bridge	Inspect		0.2					
		Replace		0.2					
		Repair		0.5			1.5	1	A, B, D

Section II. MAINTENANCE ALLOCATION CHART (continued)

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			Field			Sustainment			
			Unit		DS	GS	Depot		
			C	O	F	H	D		
0218	Post, Launching Nose	Inspect		0.2					
	Cross Girder (Special)	Replace		0.2					
0219	Roller, Landing, Bridge	Inspect		0.3					
		Replace		0.2					
		Repair		0.6			3.0	1, 2, 3	A, E
0220	Roller, Launching Nose, Bridge, Mk2	Inspect		0.3					
		Replace		0.2					
		Repair		0.2				1	A
0221	Jack Seating, Building Frame, Bridge	Inspect		0.2					
		Replace		0.1					
0222	Roller Beam Support, Adjustable, Bridge	Inspect		0.4			0.4		
		Replace		0.2					
		Repair		0.4			2.5	1, 2, 3	A, B, D
0223	Roller Beam Support, Fixed, Bridge	Inspect		0.2					
		Replace		0.2					
		Repair		0.4				1	A
0224	Support, Jacking, Bridge	Inspect		0.2					
		Replace		0.2					
0225	Pallet Assembly	Inspect		0.4			0.5		
		Replace		0.2					
		Repair		1.2			170.0	1, 2, 3	E
0226	Truck Mounting Equipment	Inspect		0.4					
		Replace		0.2					
		Repair		1.2				1, 2, 3	E
0227	Trailer Mounting Equipment	Inspect		0.4					
		Replace		0.2					
		Repair		1.5				1, 2, 3	E
0228	Miscellaneous Pins, Equipment Bag	Inspect		0.4					
		Replace		0.1					
		Repair		0.2				1, 2, 3	D
	Miscellaneous Extractor, Cable	Inspect		0.1					
		Replace		0.1					
	Miscellaneous Handle, Carrying	Inspect		0.2					
		Replace		0.2					
		Repair		0.3				1, 2, 3	E

Section II. MAINTENANCE ALLOCATION CHART (continued)

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			Field			Sustainment			
			Unit		DS	GS	Depot		
			C	O	F	H	D		
0228	Miscellaneous Sling, Multi-Leg	Inspect Replace Repair		0.3 0.2 0.4				1, 2, 3	E
03	Link, Reinforcement Set	Inspect		2.4			4.5		
0301	Anchor Piece Assembly	Inspect Replace Repair		1.4 0.2 0.4			0.6 195.0	1	A
0302	Push Bar, Long, Launching, Bridge	Inspect Replace Repair		0.2 0.1 0.4	3.0			1	A
0303	Bearer, Footwalk	Inspect Replace Repair		0.1 0.1			0.1 11.0		B
0304	Footwalk, Bridge	Inspect Replace Repair		0.1 0.1			 12.0	1, 2, 3	D
0305	Post, Footwalk, Bridge	Inspect Replace		0.1 0.1					
0306	Bracket Assembly, Jacking	Inspect Replace Repair		0.1 0.1 0.2			0.2 77.0	1	A, D
0307	Rope, Guard	Inspect Replace Repair		0.1 0.1 0.3				1	
0308	Capsill, Bridging	Inspect Replace Repair		0.1 0.1 0.2			0.2 105.0	1	A, B
0310	Link, Reinforcing, Long	Inspect Replace		0.2 0.1					
0311	Link, Reinforcing, Short	Inspect Replace		0.2 0.1					

Section II. MAINTENANCE ALLOCATION CHART (continued)

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			Field			Sustainment			
			Unit		DS	GS	Depot		
			C	O	F	H	D		
0312	Davit Post Assembly	Inspect		0.2			0.3		
		Service		0.1					
		Replace		0.2					
		Repair		1.3			49.0	1, 2, 3	A, D
0313	Puller, Ratchet Lever Cable Type	Inspect		0.2			0.2		
		Service		0.1					
		Replace		0.2					
		Repair					7.0	1	D
0314	Roller Assembly, Rocking, Bridge	Inspect		0.2			0.2		
		Replace		0.1					
		Repair		3.5			224.0	1	A, B, D
0315	Anti-Flutter, Cable Assembly	Inspect		0.1					
		Replace		0.1					
		Repair		0.3				1	
0316	Tackle, Light (w/Rope, 25 ft)	Inspect		0.1					
		Replace		0.1					
		Repair		0.3				1	
0317	Post Tensioning Assembly (Short Post)	Inspect		0.8			0.8		
		Service		0.1					
		Replace		0.2					
		Repair		2.8			309.0	1	A, B, D
0318	Pedestal, Landing Roller, Bridge, Mk2	Inspect		0.3			0.3		
		Replace		0.2					
		Repair					5.0	1, 2, 3	A, B, D
0319	Link, Launching, Two Tier	Inspect		0.1					
		Replace		0.1					
		Repair		0.2				1	A
0320	Baseplate, Building Frame, Bridge	Inspect		0.2			0.3		
		Replace		0.2					
		Repair					5.0		B, D

Section II. MAINTENANCE ALLOCATION CHART (continued)

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			Field			Sustainment			
			Unit		DS	GS	Depot		
			C	O	F	H	D		
0321	Launching Nose Unit, Heavy, Bridge	Inspect Replace Repair		0.4 0.2 0.4			0.5 5.5	1, 2, 3	A,B,C,D
0322	Jack Seating, Building Frame, Bridge	Inspect Replace		0.2 0.1					
0323	Roller, Landing, Bridge	Inspect Replace Repair		0.3 0.2 0.6			 3.0	1, 2, 3	A, E
0324	Pallet Assembly	Inspect Replace Repair		0.4 0.2 1.2			0.5 170.0	1, 2, 3	E
0325	Truck Mounting Equipment	Inspect Replace Repair		0.4 0.2 1.2				1, 2, 3	E
0326	Trailer Mounting Equipment	Inspect Replace Repair		0.4 0.2 1.5				1, 2, 3	E
0327	Block, Tackle, Bridging	Inspect Replace		0.1 0.1					
0328	Push Bar Short, Launching, Bridge	Inspect Replace		0.1 0.1					
0329	Roller Beam Support, Adjustable, Bridge	Inspect Replace Repair		0.2 0.1			0.2 41.0		
0330	Miscellaneous Equipment, Link Set	Inspect Replace Repair		0.5 0.1 0.2					

Section III. TOOLS AND TEST EQUIPMENT

(1) Tools or Test Equipment Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National Stock Number	(5) Tool Number
1	O	Tool Kit, General Mechanic's Automotive (GMTK)	5180-00-177-7033	SC 5180-90-N26
2	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common No. 1	4910-00-919-0098	SC 4910-95CLA74M
3	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Supplemental No. 1	4910-00-754-0653	SC 4910-95CLA73

Section IV. REMARKS

Reference Code	Remarks
A	Field level repair limited to replacement of rollers, pins, resilient mounts and/or Shoot Bolt and Handle along with attaching hardware.
B	Only Depot or SRA authorized complete repair, welding and testing.
C	Coat with anti-skid or non-slip paint on driving and/or walking surfaces.
D	Field repair consists of servicing, straightening (without heat), reconditioning, corrosion removal.
E	Field authorized to perform welding on this component.
F	15 Ton Jack obsolete, replaced by 20 Ton Jack.

Appendix C
EXPENDABLE AND DURABLE ITEMS LIST

Section I. INTRODUCTION

C-1. SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the Medium Girder Bridge. These items are authorized to you by CTA, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

C-2. EXPLANATION OF COLUMNS

a. Column (1) - Item number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material.

b. Column (2) - Level. This column identifies the lowest level of maintenance that required the listed item. [C - Operator/Crew]

c. Column (3) - National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4) - Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. Column (5) - Unit of Measure (U/M). Indicates the measure used in performing the actual operational/ maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	C	9150-00-190-0907	Grease, Automotive and Artillery (81349), MIL-G-10924.	LB
2	C	9150-00-263-3490	Oil, Lubricating, General Purpose, Low Temp., MIL-L-7870A.	QT
3	C	6850-00-281-1985	Solvent P-D-680	GL
4	C	8030-00-081-2330	Thread Locking Compound, 242 Med. Strength	EA
5	O	7920-00-255-7529	Stiff Bristle Brush H-B-292	EA
6	O		Jointing Compound, DTD 369 A	LB
7	O		Use item 21	
8	O	6850-00-973-9091	Penetrating Oil	12 oz
9	O	6810-00-241-1203	Copper Sulphate	LB
10	C	5350-00-221-0872	Crocus Cloth	PG
11	C		Use item 21	
12	C		Use item 21	

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
13	F	8030-99-220-2727	Sealing Compound, DTD 900/4690	KT
14	C	8030-00-165-8577	Primer (wash) Pretreatment, DOD-P-15328, (Formula Number 117 for Metals), 5 gallon.	KT
15	C	8010-01-193-0517	Primer Coating, Epoxy, MIL-P-53022, Type I	GL
16	C	8010-00-082-2477	Primer Coating, Epoxy-Polyamide, Chemical and Solvent Resistant, MIL-P-23377, Type I (see note 1), 10 gallon	KT
17	C	8010-01-160-6743	Coating, Aliphatic Polyurethane, Chemical Agent Resistant, MIL-C-46168 (Type II), Component A (see note 2), Green 383, Color Number 34094, 55 gallon	KT
18	C	8010-01-132-0205	Coating, Aliphatic Polyurethane, Chemical Agent Resistant, MIL-C-46168 (Type II), Component B (see note 2, 55 gallon	KT
19	C	8010-00-280-1751	Thinner, MIL-T-81772, Type I, 55 gallon.	GL
20	C	8010-01-168-0684	Thinner, MIL-T-81772, Type II, 55 gallon.	GL
21	C	8010-00-141-7838	Walkway Compound, Non-slip and Walkway Matting, Non-slip MIL-W-5044 Type II.	GL
22	F	7530-00-181-7174	Paper, White, Copier Bond, 80 gm/m^2	
23	F	8040-01-334-9382	Adhesive Cement, Bostik Primer 9252 DTD	KT
24	F	8040-01-125-4675	900/4679A. Bostik Adhesive 2402	KT
25	F	8040-01-164-1463	Bostikure D Curing Agent	KT
26	O	7510-00-558-2114	Paintstik, (94858) B-White	DZ
27	C	8010-00-582-5318	Zinc Chromate Primer, (81348) TT-P-1757	GL
28	O	6850-00-826-0981	Kit (Dye Penetrant), (81349) MIL-I-25135, Type II	KT

NOTE 1 : Consult your local environmental co-ordinator before beginning any painting operation; use of some materials may be prohibited locally. Where use of chromate-containing coatings is prohibited, substitute MIL-P-53022 (420 grams/liter VOC), NSN 8010-01-187-9820, for MIL-P-23377.

NOTE 2 : Four parts component A are mixed with one part component B; if you order four drums of component A, one drum of component B will also be shipped. Single component MIL-C-53039, NSN 8010-01-232-8514, may be substituted for two component MIL-C-46168; type IV MIL-C-46168 may also be substituted for type II.

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Appendix D

TORQUE LIMITS

The following torque figures apply during the repair of the 15T and 20T hydraulic jacks.

Base screws ..... 65ft lb

Ram liner..... 75ft lb

Pump barrel..... 90ft lb

Suction and delivery and valve screws ..... 50ft lb

Base toe grub screw ..... 50ft lb

These repairs are covered in detail in Chapter 3 Direct Support Maintenance.

Appendix E

WELD PROCEDURES

Component Adapter bracket, push bar, long and short.

Welding Process Manual metal arc.

Welding Position Horizontal, vertical and flat.

Preparation and cleaning Degrease thoroughly before welding.

Welding Consumables E.S.A.B. Mildtrode 46.0 or equivalent to:

BS 639, E43 22R (11)
A.W.S. A5.1-81 (E6013)
ASME SFA-5.1 (E6013)

Preheat Nil.

Welding Conditions

Weld Size	Electrode Size	Current
7/8 in. fillet	5 mm	210-250 amp
1/4 in. fillet	4 mm	120-180 amp
1/8,3/16 in. fillet	3.25 mm	90-125 amp
1/8 in. fillet	3.25 mm	90-125 amp

GLOSSARY

Abbreviations	Explanation
AA(L)	Anchor assembly, long
AA(S)	Anchor assembly, short
approx.	approximately
atten.	attention
BP	Bottom panel
BSB	Bankseat beam
CRB	Capsill roller beam
cm	centimeter
CONC	Concentric
DS	Double story bridge, Direct support
DSM	Direct Support Maintenance
E	End of bridge
EA	Each
EIR	Equipment Improvement Recommendations
ETP	End taper panel
ESC	Equipment Serviceable Criteria
FRB	Front roller beam
ft	foot (feet)
ft lb	Torque units
GAA	Grease, Automotive and Artillery
gal	gallon
g	gram
gm/m^2	grams per meter squared
in	inch (inches)
JP	Junction panel
kg	kilogram
KT	Kit
LB	Pound
LLN	Light launching nose
LNH	Launching nose heavy
LNL	Launching nose link
LNCG	Launching nose cross girder
LNR	Launching nose roller

Abbreviations	Explanation
LR	Landing roller
LRS	Link reinforcement set
m	meter
MAC	Maintenance Allocation Chart
MTOE	Modified Table of Organization and Equipment
max.	maximum
MGB	Medium girder bridge
min.	minimum
MLC	Military load class
mm	millimeter
MWO	Modification Work Order
NSN	NATO Stock Number / National Stock Number
oz	ounce
oz/yd^2	ounces per square yard
PBCG	Push bar cross girder
PMCS	Preventive Maintenance Checks and Services
PT	Post tensioning assembly
PTFE	Polytetrafluoroethylene
QT	Quart
RB	Roller beam
RPSTL	Repair Parts and Special Tools List
SS	Single story bridge
T	ton
TAMMS	The Army Maintenance Management System
TM	Technical manual
TMDE	Test Measurement & Diagnostic Equipment
thru	through
TP	Top panel
U/M	Unit of Measure
wt	weight
yd	yard

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ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON *(Provide exact wording of recommended changes, if possible).*
	0032 00-7					Illustration in upper right corner needs to show O-ring.
	0036 00-4					Need to fill fluid system after installing pump in step 9, and before installing or lowering yoke.

SAMPLE

**Reference to line numbers within the paragraph or subparagraph.*

TYPED NAME, GRADE, OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
Pat Smith	AV272-4162	Pat Smith

DA FORM 2028, FEB 74 REPLACES DA FORM 2028, 1 DEC 68, WHICH WILL BE USED. USAPPC V3.00

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is ODISC4.	Use Part II (reverse) for Repair Parts and Special Tools Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	**DATE:**

TO: *(Forward to proponent of publication or form) (include ZIP code)* AMSTA-LC-CI Tech Pubs, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630	**FROM:** *(Activity and location) (include ZIP code)*

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 5-5420-212-23	**Aug 1992**	**MEDIUM GIRDER BRIDGE (MGB)**

ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON *(Provide exact wording of recommended changes, if possible).*

**Reference to line numbers within the paragraph or subparagraph.*

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TO: *(Forward direct to addressee listed in publication)*	**FROM:** *(Activity and location)* *(include ZIP code)*	**DATE:**
AMSTA-LC-CI Tech Pubs, TACOM-RI 1 Rock Island Arsenal Rock Island, IL 61299-7630		

PART II - REPAIR PARTS AND SPECIAL TOOLS LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 5-5420-212-23		**MEDIUM GIRDER BRIDGE (MGB)**

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III - REMARKS *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE, OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 decagram = 10 grams = .35 ounce
1 hectogram = 10 decagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN: 070342-000

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